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U.S. EQUITY MARKET STRUCTURE PART I: A REVIEW OF THE EVOLUTION OF TODAY'S EQUITY MARKET STRUCTURE AND HOW WE GOT HERE

HEARING

BEFORE THE

SUBCOMMITTEE ON CAPITAL MARKETS, SECURITIES, AND INVESTMENT

OF THE

COMMITTEE ON FINANCIAL SERVICES

U.S. HOUSE OF REPRESENTATIVES

ONE HUNDRED FIFTEENTH CONGRESS

FIRST SESSION

JUNE 27, 2017

Printed for the use of the Committee on Financial Services

Serial No. 115–24

U.S. GOVERNMENT PUBLISHING OFFICE

28–221 PDF WASHINGTON : 2018

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U.S. EQUITY MARKET STRUCTURE PART I: A REVIEW OF THE EVOLUTION OF TODAY'S EQUITY MARKET STRUCTURE AND HOW WE GOT HERE

Tuesday, June 27, 2017

U.S. HOUSE OF REPRESENTATIVES,
SUBCOMMITTEE ON CAPITAL MARKETS,
SECURITIES, AND INVESTMENT,
COMMITTEE ON FINANCIAL SERVICES,
Washington, D.C.

The subcommittee met, pursuant to notice, at 10:04 a.m., in room 2128, Rayburn House Office Building, Hon. Bill Huizenga (chairman of the subcommittee) presiding.

Present: Representatives Huizenga, Hultgren, Wagner, Poliquin, Hill, Emmer, Mooney, MacArthur, Davidson, Budd, Hollingsworth, Hensarling, Maloney, Sherman, Lynch, Scott, Himes, Ellison, Foster, Sinema, Vargas, and Gottheimer.

Also present: Representative Loudermilk.

Chairman HUIZENGA. This hearing of the Subcommittee on Capital Markets, Securities, and Investment is called to order. Without objection, the chair is authorized to declare a recess of the committee at any time. This hearing is entitled, "U.S. Equity Market Structure Part I: A Review of the Evolution of Today's Equity Market Structure and How We Got Here."

We have a busy day ahead of us.

We have two panels, and we are going to get rolling here. So without objection, as well, the gentleman from Georgia, Mr. Loudermilk, is permitted to participate in today's subcommittee hearing. Mr. Loudermilk is a member of the Financial Services Committee, and we appreciate his interest in this important topic.

I now recognize myself for 3 minutes to give an opening Statement. Modern equity markets trace their origin back to an agreement signed under the buttonwood tree on Wall Street in 1792, but over time these markets have become central to Main Street as well.

Companies all around the world need access and the ability to raise capital for job creation, to grow their businesses, and to innovate. Additionally, hardworking Americans rely on the capital markets to save for everything from college tuition to retirement.

In 1975, Congress amended the Securities and Exchange Act of 1934 and directed the Securities and Exchange Commission (SEC) to establish a national market system in which all orders to buy and sell securities would interact.

Since that time, the structure of the U.S. equity markets has significantly evolved. Today's modern U.S. equity market structure has been shaped by four regulatory initiatives promulgated by the U.S. Securities and Exchange Commission: Order Handling Rules in 1996, Regulation ATS in 1998, Decimalization in 2000, and Regulation NMS in 2005.

Since 1975, there have been technological advances, as we all know, as we peer at our iPhones and other electronic devices, and today a significant amount of trading is now performed by automated computer algorithms used by many different market participants.

These participants include electronic market makers and high-frequency traders who seek to capture small profits from thousands of individual trades.

These market participants also include large institutions seeking to accumulate significant positions without affecting the market and they include broker dealers seeking to provide retail investors with the best executions for their order. As trading has become increasingly automated, market activity is now measured in milliseconds and microseconds.

By most objective measures, execution speeds, bid-ask spreads, trading costs, and market depth and liquidity investors have benefited significantly from the development of more competitive equity markets and the rise of electronic trading. These improvements, however, do not mean that the current structure and operation of these markets is perfect.

Some critics of the current market structure have pointed out that with around a dozen public exchanges and 50 alternative trading venues, today's equity markets are overly complex and fragmented. Others point to technical problems that have disrupted markets as evidence that the current market structure is not optimal.

We all acknowledge that the U.S. equity markets are widely recognized for being the deepest, most liquid and most competitive markets in the world.

However, it doesn't mean that these markets are perfect and there is room for improvement. That is why a truly comprehensive review of equity market structure is long overdue.

Today's hearing will review the current state of U.S. equity markets and review how the current structure has evolved since the enactment of the Securities Acts Amendments of 1975. We will hear from industry participants and experts on what is working well in today's equity markets, as well as areas that need improvement or impacting the optimal functioning of the markets.

In order to move markets forward, we need to know where they have been. As a Michigan member, we often talk in car analogies, and I would like to say in order to look forward through the windshield, we first must take a glimpse in the rearview mirror. I look forward to hearing from our witnesses today.

And the chair now recognizes the ranking member of the subcommittee, the gentlelady from New York, Mrs. Maloney, for 5 minutes for an opening statement.

Mrs. MALONEY. Thank you. Thank you very much. I thank our witnesses for being here and the chairman for holding this impor-

tant hearing. The United States has the deepest, most liquid, and most efficient capital markets in the world. The strength of our markets is a key contributor to our country's overall economic strength.

But we can always look at how we can improve them. We need to continually work to make sure that our markets are safe, competitive, innovative, and fair to all investors.

The purpose of this hearing is to review the evolution of our equity market structure, and of course this discussion would not be complete without a discussion of the SEC's Regulation National Market System, NMS, which fundamentally overhauled market structure in the U.S..

When the SEC passed Reg NMS 12 years ago—in fact it will be exactly 12 years ago this Thursday—the goals were to promote price competition, protect investors, and enhance market efficiency.

After 12 years, it makes sense to take a step back, review the changes that have taken place and ask what did we get right in Reg NMS, what did we get wrong, and what can we improve?

But first, it is important to remember that our equity markets are undoubtedly better today than they were a decade ago. Today's retail investors have better access to the markets at lower costs than ever before, and we should not lose sight of these benefits. However, our markets are by no means perfect, and I strongly believe that improvements can and should be made.

In order to identify potential improvements, we must review what has changed as a result of Reg NMS and whether those changes were intended or unintended.

Price competition has undoubtedly increased, as the number of different trading venues available to investors has exploded. Some in the markets argue that this price competition has come at the expense of market efficiency.

However, as the large number of trading venues has led to fragmented markets, there is obviously a fine line between too many trading venues and too few trading venues. Whether we have the right balance is one of the issues that I hope we will explore today.

As a few of the witnesses note in their testimony today, Reg NMS also promoted market-wide price competition, which undoubtedly lowered costs for investors, but also gave rise to high-frequency trading and prioritized speed over all else.

Another lesson from Reg NMS is that even small changes in market structure regulations can have large consequences. That is why I think that the best changes in market structure will be grounded in data and empirical evidence.

I am pleased that the SEC is currently conducting a Tick Size Pilot Program to test whether increasing the minimum trading increments will really enhance liquidity. This Tick Size Pilot has gotten off to a bumpy start and the implementation costs were high, but I am hopeful that it will yield solid data that we can use to improve the market structure.

Finally, Reg NMS made so-called NMS plans much more important, which is the source of much controversy and which I think we will hear a lot about today.

NMS plans are essentially committees that administer key parts of the National Market System such as the public data feeds that

show the best available price for each stock. These NMS plan committees are comprised of self-regulatory organizations, essentially the exchanges in the Financial Industry Regulatory Authority (FINRA).

Neither the sell-side brokers nor the buy-side investors have a seat on these NMS plan committees and therefore don't get a vote on how these plans are operated. As I said, this is the source of much controversy.

I am pleased that we have all of the parties in this debate here with us today, and I hope that we could have a robust discussion of this issue.

I look forward to the testimony from both of our panels, and I yield back.

Chairman HUIZENGA. The gentlelady yields back.

The chairman recognizes the gentleman from Illinois, the vice chairman of the subcommittee, Mr. Hultgren, for 2 minutes for an opening statement.

Mr. HULTGREN. Thank you, Chairman Hensarling, for convening this important hearing today. Thank you to all of our panelists.

Many of the issues we discuss in this subcommittee are somewhat detailed, and I would say the discussion today will even be more detailed and complex, but it is important for us to understand. Congress has a responsibility to ensure that our equity markets are structured in a way that maximizes capital formation for job creators and protects the interest of investors saving for retirement.

Since serving in Congress, the publication of "Flash Boys" piqued my interest in trying to better understand our equity markets. I did not come to the same conclusion as the author of the book, that our markets are rigged, but it did bring some of these issues to the forefront for public debate, which I think is important.

As Congress and the SEC review the rules governing our market structure, it is important we are all on the same page in terms of our objectives.

By many measures our equity markets are operating more efficiently than they ever have. Spreads and execution costs are the lowest they have ever been, meaning it is more affordable for retail investors to participate in markets, which historically, were only accessible to the most sophisticated investors.

However, it is also worth noting that a number of significant events have shaken investor confidence, which is foundational to our markets. For example, I remember visiting with a number of firms in Chicago on August 24, 2015 when there was great volatility and at the time an inexplicable dislocation between the prices of exchange-traded funds and their underlying securities.

There are a lot of issues that merit discussion today, whether it is market pricing structures, speed bumps, market data, or order routing, but no aspect of our market structure should be debated in a silo. They are all far too interconnected.

I believe our equity markets are functioning well, but if we do not continue to review opportunities for improvement, it may not be long before the United States leadership begins to falter.

To that point, as European regulators implement Markets in Financial Instruments Directive (miFID) II, our regulators should be

engaged in the policy implications and take appropriate steps so the U.S. capital markets remain competitive.

While Congress will undertake its own work, I am looking forward to your feedback on the work of the SEC and its Equity Market Structure Advisory Committee.

Thank you again to all of our witnesses. I look forward to reviewing and discussing the recommendations detailed in your testimony.

I would also be remiss in not mentioning that Chris Concannon, President and COO of the Chicago Board of Options Exchange, is testifying today. CBOE recently acquired Bats, which I believe, will be a great help to Chicago to continue its role as a leader in the Midwest for finance.

With that, I yield back.

Chairman HUIZENGA. The gentleman's time has expired.

As we start on this, I do want to say that today we have a busy day. We have two panels that are going to be happening, but this is actually based off of some of the work that our previous Chairman of the Capital Markets Subcommittee, Scott Garrett, had done. He convened some roundtables and really had started to get this conversation going.

I think that this an important time for us to work on a bipartisan basis to see where we could go to what these markets might look like for the future.

Today, we are very pleased to welcome on this first panel, Matt Lyons, who is the Senior Vice President and Global Trading Manager of The Capital Group on behalf of the Investment Company Institute; Joseph Saluzzi, partner of Themis Trading, LLC.; Ari Rubenstein, CEO of Global Trading Systems; and Jeff Brown, Senior Vice President, Legislative and Regulatory Affairs for Charles Schwab, and he is here on behalf of the Securities Industry and Financial Markets Association.

Part of what I wanted to do was to get these participants in first and then our second panel, which is going to consist of Thomas Farley, President of the New York Stock Exchange; Brad Katsuyama, CEO of The Investors Exchange; Chris Concannon, as was referenced, President and COO of the Chicago Board of Options Exchange; John Comerford, Head of Global Trading and Research of Instinet; and Tom Wittman, Executive Vice President and Global Head of Equities for NASDAQ.

I wanted to get those participants in first and then get those who are running the markets in for our second panel. We are going to have a busy day, and I really appreciate all of the time that you are giving us here today.

With that, I will recognize Mr. Lyons first for an opening 5-minute statement.

STATEMENT OF MATT LYONS

Mr. LYONS. Thank you, Chairman Huizenga, Ranking Member Maloney, and the rest of the subcommittee. I just want to extend my thanks for inviting me to testify today about these important issues.

My name is Matt Lyons. As you mentioned, I am the global trading manager of the Capital Group company. It is the home of the

American Funds. Capital Group manages more than $1.5 trillion in equity and fixed income assets on behalf of millions of investors for institutions and individuals.

The Capital Group is an active investment manager who employs fundamental analysis and has a singular focus on delivering superior long-term results to our clients. I also chair the Investment Company Institute's (ICI's) Equity Market Advisory Committee.

ICI members are regulated funds including mutual funds, exchange traded funds, closed end funds, unit investment trusts, and its members represent more than 95 million individual investors, retail investors, representing over $19 trillion in assets.

My personal experience has been gained—I have personal experience which has been gained working in the equity markets for the past 30 years of my career.

Regulated funds, such as the funds managed by the Capital Group, play a critical part in capital formation in the United States. These funds invest in the equity markets on behalf of millions of retail investors saving for their long-term financing goals.

We applaud the subcommittee for looking at the state of the equity markets today. I believe we offer a unique perspective on behalf of the millions of clients we serve and our commitment to improving their long-term investment outcomes.

Regulated funds are specifically aligned with the objectives of the National Market System. That is to serve the interest of long-term investors and listed companies.

As an initial matter, I would like to say that the U.S. equity market is among the fairest, most efficient, and most competitive markets in the world. It allows companies to raise capitals, to create jobs, to grow their business, and innovate.

Key elements of today's equities market structure stem from the 1975 amendments to the Security Exchange Act and Regulation NMS. Although this legal framework has contributed to efficiency of the markets, I believe it is overdue for an inspection.

We believe the SEC should lead the efforts to examine and improve equity market structure while keeping in mind the key objectives of Reg NMS to serve the interests of long-term investors and listed companies.

To that end, the SEC should prioritize reforms that will minimize conflicts of interest and promote transparency in the equity markets. I have made six recommendations in my written testimony, but I will highlight three areas that I think need particular attention.

The first is prevalent pricing model in the U.S. equity markets known as maker-taker, which involves charging fees to participants that remove liquidity while paying rebates to those participants who add liquidity.

This fee structure results in an inherent conflict of interest, potentially aligning the brokers' economic interests against those of their customers. Broker dealers have an incentive to route client orders in a way that maximizes rebates or minimizes fees and even if this results in a suboptimal outcome for their customer.

The SEC should conduct a pilot program to evaluate how access fees and liquidity rebates affect trading in highly liquid stocks. An effective pilot program would examine whether investors benefit

from a market structure with lower access fees and in particular, zero rebates.

NMS plan governance also needs reform. The plans administer key aspects of market structure and affect all market participants, but they are controlled by self-regulatory organizations that may have conflicts of interest.

Other market participants, such as regulated funds, lack any meaningful voice in the plan operations. NMS plan governing bodies would be far better informed and better able to police the conflicts of interest if they included non-SROs including representative of regulated funds.

The third area that must be addressed is the lack of transparency that institutional investors have into the order handling activities of broker dealers and the operation of alternative trading systems. Today, stocks trade on roughly four dozen platforms, each with its own set of rules, order types, and unique fee schedule.

In this fragmented and complex market structure, the order routing decisions, and by extension, the choice of execution venue, are extremely important to assessing execution quality, reducing information leakage and improving returns for fund investors.

Unfortunately, the securities laws provide investors with inadequate information about either broker order, handling practices or the operation of ATSes making it difficult for regulated funds to monitor broker dealers and trading venues. We believe that all institutional investors should have access to detailed information concerning the handling of their orders.

Likewise, all market participants should have information about how ATSes operate. The SEC has proposed rules that would greatly enhance transparency in these areas, and we urge the Commission to finalize these rules without delay.

The conflicts of interest inherent in maker-taker pricing and the governance of NMS plans and the opacity surrounding broker dealer ordering handle practice in ATS operations, work to undermine the fairness and integrity of our equity markets.

These practices harm long-term investors, including the 95 million Americans who invest in regulated funds. Regulators and market participants should address these issues promptly and to modernize equity market structure and to create the market, better serving the interest of long-term investors and listed companies. I am happy to answer any questions that you have.

[The prepared statement of Mr. Lyons can be found on page 109 of the Appendix.]

Chairman HUIZENGA. The gentleman's time has expired.

I should mention as well, which I neglected to do, that your written testimoneys will be put into the record without objection as well. As we are going to be gathering, not everybody is going to agree on these panels either as well, and so we think this is a good time and a good thing to be exploring.

With that, Mr. Saluzzi, you are recognized for 5 minutes.

STATEMENT OF JOSEPH SALUZZI

Mr. SALUZZI. Thank you, Chairman Huizenga, Ranking Member Maloney, and members of the subcommittee for giving Themis Trading the opportunity to testify on this important topic. We want

to applaud the subcommittee for taking the time to examine and question the functioning of our equity market structure, even in this time of relatively low volatility when complacency can sometimes take hold.

We believe that the time to be asking tough questions is exactly now while the market is not under stress as it was in 2008 through 2010. My name is Joseph Saluzzi. I am a partner and co-founder of Themis Trading. We are a no-conflict, institutional agency broker.

We do not make markets. We do not trade proprietarily. We do not own a dark pool. Our only business is providing best execution for our institutional clients. We are agents for long-term investors who collectively manage well over $1 trillion of long-term investor funds.

My partner Sal Arnuk and I started Themis Trading in 2002 to leverage our expertise in navigating the electronic landscape of trading. In the 1990s, we navigated in an environment in which regulators tried to rectify many of the problematic features of market structure at this time.

In the 1990s, specialists had engaged in imperfect activity. NASDAQ market makers colluded in keeping bid-ask spreads artificially wide. In Themis, we hoped to grow a firm that utilized electronic tools to source liquidity for our clients in the cleanest and natural ways.

By the mid 00s, we recognized that there was a new equity market structure forming with a multitude of ECNs, dark pools, trading venues, which was evolving in especially troubling ways. Complexity was rapidly increasing.

A new breed of short-term, high-frequency trader was rising, a breed that evolved from many of what you would call were the SOES bandits of yesteryear. These traders were becoming the dominant form of liquidity in our markets, with business models built around arbitraging faster and slower quotes on different venues.

These firms realized that seconds, milliseconds, and now microseconds mattered, and they realized to capitalize on their proprietary trading arbitrage, they needed the tools which were supplied by the stock exchanges, such as colocation, special order types, proprietary data feeds. I will try not to get into all of the jargon, but there is a lot of it and the details really do matter here.

In our efforts to improve our trading for our clients, we began investigating under the hood how the stock market really worked. We expressed our concerns to our clients, to our regulators, to the industry in general.

We also began sharing our concerns publicly. We wrote white papers. We have a Themis Trading blog that we run fairly actively now. We are active on social media. In other words, we are not quiet participants in this market structure debate.

Our first white paper was titled "Toxic Equity Trading." It was written in 2008. It is 2017, right, so we are still talking about this stuff. In 2012, we summarized our findings and published a book called "Broken Markets." While not quite "Flash Boys,"—we didn't sell as many copies—we think the material is very important.

Sadly, many of our concerns that we highlighted in the book are still a problem today. Today's stock market is comprised of 13 stock

exchanges, 12 active of those 13, 40 alternative trading systems. I won't bore you with all the details, we will get to those later, but the problem is is that they are not regulated with the same disclosure and the same practices yardstick.

The fragmentation which escalated after the SEC passed Reg NMS is the source of most of our problems. While the SEC believed that Reg NMS would create competition among the stock exchanges, we are certain that they did not anticipate that their regulations would have resulted in a high-speed competition to trade against long-term investors.

And we hope that the SEC didn't think that all this fragmentation and complexity would be a desired result, and I think most of my panelists and the next panel would agree that what we have right now is not what the SEC intended.

Our modern markets are built on high-speed races around a fragmented web of liquidity. Our primary concern is how the stock exchanges have changed over time and since they have become for profit venues. Quite frankly, we think they have lost their way.

They are no longer impartial referees, but instead are now players in the game with a vested interest in the outcome. Two exchange practices, which I will get into later, which are particularly harmful, we think, to investors, are, one, like Mr. Lyons said, is the maker-taker rebate model. This is the source of many conflicts of interest.

The second is the proprietary data feeds, and we will get into that later as well, as I see I am running out of time. Our written testimony also covers other main concerns, which include dark pool disclosures; broker order routing disclosures; market maker obligations; payment for order flow for internalizers; the role of academic studies, which needs to be questioned; the revolving regulatory door, which needs to be questioned.

Quite frankly, I have explained a lot of issues with our fragmented market structure. It is conflicted, it is complex and it would be naturally and competitively less so if regulators would act only some common sense reforms.

We don't think an entire holistic review is necessary. Things like eliminating payment for order flow and reducing and restricting some of the information that is coming from these proprietary data feeds can go a long way in solving the fragmentation and the complexity that we have. With that, I would like to thank you, and I look forward to answering your questions.

[The prepared statement of Mr. Saluzzi can be found on page 139 of the Appendix.]

Chairman HUIZENGA. Appreciate that.

With that, Mr. Rubenstein you have 5 minutes.

STATEMENT OF ARI RUBENSTEIN

Mr. RUBENSTEIN. Thank you Chairman Huizenga, Ranking Member Maloney, and distinguished members of the committee. It is a real personal honor for me to be here today to discuss with you these important market structure issues and how we can work together to keep America No. 1 in capital markets and finance.

You know, this summer, it will be 25 years ago that I started as a runner on the floor of the Commodities Exchange at the former

World Trade Center, where the biggest piece of technology we had down there at the time was the telephone.

It was about a decade later that I felt that technology could evolve our markets in ways that would bring enormous benefits for investors. It was at that point that I helped start my current company, GTS.

GTS is an electronic market maker. We provide offers to buy and sell thousands of investment instruments electronically across global markets. All of our trading is quantitatively based and automated using computers.

We are also the largest designated market maker, or DMM, at the New York Stock Exchange. This means we are uniquely and directly responsible and accountable to over 900 public companies for making sure there is ample liquidity available for their investors throughout the trading day, should they need it.

That list includes some well-known companies such as ExxonMobil, Berkshire Hathaway, and AT&T. Most recently, we handled the IPO of the technology company Snapchat, which was the largest IPO over the last 3 years, and raised nearly $4 billion for the company and its workers.

Our goal at GTS is to do for the capital markets what Amazon has done for online commerce, use technology in a responsible way to promote more efficiency for public companies and save their investors money. We do this by adhering to our core principles of transparency and innovation. That yields investor confidence and lower costs.

Our efforts help companies navigate the capital markets, raise capital, grow, and employ workers. We have witnessed the capital markets evolve tremendously since the days I was frantically on the floor of the exchange yelling, buying and selling orders.

Like many industries, technology has transformed the business, and just like the conveniences and cost savings we all enjoy using the Internet and technology, the financial markets participate in the same way.

For example, thanks to some smart regulation and the advanced technology electronic market makers have deployed, the cost to trade has gone down dramatically, by more than 50 percent, in the last 10 years alone. According to Vanguard, due to today's reduced trading costs, investments in a mutual fund over a 30-year period will end up with a 30 percent higher return.

There were concerns late last decade that the vulnerability of electronic systems would pose a threat to the markets. The SEC and FINRA enacted rules to address many of these issues. Market access rules, regulation SCI, the consolidated audit trial are all positive and necessary advancements to our markets, but there is more that needs to be done.

The first is we shouldn't squander our resources trying to fix problems that don't exist. I have witnessed a lot of alarms being rang over the last few years for problems that really aren't there and then to hear solutions which are questionably positive in the grand scheme of things.

One example is a recent proposal by one of the national securities exchanges to offer an alternative closing auction for securities listed on other markets. This is creating a little unease for public

companies and their investors, which we are all here to serve. Any discussion about market structure ought to include the needs of our public companies.

So here is what we should be spending our time on. First, more resiliency to cybersecurity. This is often overlooked in the debate about market structure, but an all-electronic market, like many other technology-dependent sectors in our economy, needs vigilance on this issue. We need to double down on our efforts to prevent hacking and cyberattacks, and a better system for sharing information between key stakeholders, because we all have a collective interest in preventing such a problem.

Next, we need to do more to detect electronic trading fraud and abuse. I am a member of the FINRA Market Surveillance Advisory Group, whose goal is to assist FINRA in the construction of an advanced artificial intelligence and machine learning system to eradicate nefarious activity in our markets. This is a great and impressive start, but more time and budget is necessary to complete these projects.

Finally, we need to further improve the securities information processor (SIP) market data feed. Investors need the most accurate information possible when making investment decisions. While investors and market participants have equal access to all publicly available data, the SIP is the most widely used and the least expensive solution. The perception of a SIP feed that operates at a significant disadvantage to direct feeds could eventually drain investor confidence.

Our markets are stronger and more efficient than ever, and certainly the envy of the world, but we should not rest on our laurels. Thanks to the hard work of people from the industry and the regulatory bodies, we can deploy these changes from a position of strength. Thank you for this opportunity, and I am happy to answer any questions that you have.

[The prepared statement of Mr. Rubenstein can be found on page 123 of the Appendix.]

Chairman HUIZENGA. Thank you.

Mr. Brown, you are recognized for 5 minutes.

STATEMENT OF JEFF BROWN

Mr. BROWN. Chairman Huizenga, Ranking Member Maloney, and distinguished members of the subcommittee, my name is Jeff Brown, and I am Senior Vice President and Head of the Office of Legislative and Regulatory Affairs for the Charles Schwab Corporation.

It is my honor today to appear before the subcommittee on behalf of the Securities Industry and Financial Markets Association, otherwise known as SIFMA. SIFMA represents a broad range of financial services firms, including Schwab, that are active in our capital markets and dedicated to making our markets the best in the world.

Congress first mandated the establishment of a national market system in 1975. At that time, most equity trading took place manually on the trading floor of an exchange. Today's market is fully electronic and automated with a vibrant ecosystem of competing

market venues including more than a dozen exchanges and more than 40 alternative trading systems.

Although advances in technology had a major role to play in the evolution of our markets, there have been three major regulatory developments since 1975 that have created the capital markets of today.

First, in 1998 the SEC adopted Regulation ATS which established regulatory standards for alternative trading systems. The net result of Regulation ATS has been the growth of trading venues that offer varying business models and compete for per order flow to the benefit of all investors.

Second, in 2001, decimal pricing began. After nearly 200 years of a system in which equities traded in fractions, trading in pennies revolutionized our markets, spurring the rapid growth of electronic trading and increasing liquidity.

Finally, in 2005, the SEC adopted Regulation NMS, which was predicated on the need to foster more efficient markets by prompting fair competition, while at the same time ensuring that the markets were linked together to encourage the interaction of and competition between the orders of buyers and sellers.

The centerpiece of Regulation NMS is Rule 611, the Order Protection Rule. Simply stated, the rule was designed to ensure that displayed investor orders cannot be ignored or traded through. Together, these changes, both regulatory and technological, have created markets that are unrecognizable from the markets of 10 and 20 years ago.

The markets today are highly automated and efficient, providing near instantaneous low-cost executions. Retail investors, Schwab's clients in particular, have benefited from an incredibly competitive and dynamic marketplace.

There is one other historical shift that has played an important role in the development of today's market. In the early and mid-2000s, the national securities exchanges began to become for-profit companies instead of broker-dealer-owned utilities.

Today, the largest exchanges are owned by publicly traded corporations. As such, they now have a fiduciary duty to deliver profits to their corporate shareholders. This has radically changed the incentives that exist in our capital markets and created conflicts of interest that remain unaddressed.

While we understand and appreciate that the subcommittee intends to evaluate policy options at a later date, we would like to highlight two critically important areas that we believe policymakers need to address to deal with significant inefficiencies.

First, we believe that the entire concept of self-regulatory organizations, or SROs, and the National Market System plans which they control, need to be rethought. SIFMA believes that strong self regulation must continue to be an integral part of the oversight of our market and its participants.

Exchanges, however, continue to act as SROs, even though they have become competitors with their former owners. In other words, for-profit companies act as regulators of the very market participants with which they directly compete.

SROs also manipulate NMS plans to advance their commercial interest at the expense of the industry and the investors they

serve. These conflicts of interest are obvious, and we believe Congress or the SEC need to move quickly to rethink the role and responsibilities of the SROs in light of this new reality.

Second, we believe the market data system, the way investors receive bids, offers, last sales and other critical information that is the lifeblood of any effective market, remains locked in a 1970s structure and is in serious need of overhaul.

Today, the exchanges offer their own market data streams faster and with far better and deeper information, but at sharply escalating fees. The consolidated data stream, which the industry must purchase by rule, is slower and contains only ephemeral top-of-book quotes. This structure has returned us to an era when privileged pros get access to better, more timely market information than ordinary investors.

This outcome is absolutely contrary to all that has occurred over the last two decades of regulatory and technological development. We urge the SEC or Congress to address this glaring issue. Thank you for the opportunity to testify today, and I look forward to answering your questions.

[The prepared statement of Mr. Brown can be found on page 72 of the Appendix.]

Chairman HUIZENGA. Thank you very much, I appreciate that.

With that, I am going to recognize myself for 5 minutes for questionings.

We talked about 1975 a bit here and what the SEC had done. The question I have regarding Reg NMS, I think is a big element, and I want to direct this to both Mr. Lyons and Mr. Brown very quickly because you are representing larger industry trade groups. Sort of what is working well with the current U.S. equity market structure, what are some areas that can be improved, but I would like to know what consensus really does the industry have as a whole? Are there some areas that we can address?

Mr. Brown, why don't you?

Mr. BROWN. Thank you, sir. What is working well, particularly from Schwab's perspective, is the fact that, since Reg NMS, a market structure has evolved that allows retail investors to obtain far better price improvement and much better execution quality than exists if they were to flow through two exchanges.

I really believe that innovation in itself has been a driver in maintaining the U.S. as a country that has the highest participation of individual investors in the world, and—

Chairman HUIZENGA. So you are saying the cost of a trade?

Mr. BROWN. The cost of trading and the execution quality they receive.

Chairman HUIZENGA. OK.

Mr. Lyons, real quickly?

Mr. LYONS. So I think technology and the regulation environment we work in today has really empowered the buy side, the people that I represent and the client that they work on behalf of, to have more control over the order and the direction of the order that they have. So I think that is a huge benefit.

We have automatic access to information, it is much more relevant, so a lot of—

Chairman HUIZENGA. Are you talking the retail investor or—

Mr. LYONS. Yes, we—

Chairman HUIZENGA —an institutional investor?

Mr. LYONS —I mean, retail investors we represent. The regulated funds that I speak for represent over 95 million retail investors. That is really what they are.

Chairman HUIZENGA. All right.

Mr. LYONS. So it works well and it enables us to efficiently work in the markets. I think when I tried to stress both in my written and my oral testimony that where we fall short is in certain conflicts of interest that exist today, certainly in the broker routing practices and the maker-taker pricing scheme, and also around transparency of those broker order routing practices for us to be able to analyze more effectively the quality of the execution we receive from the brokers.

Chairman HUIZENGA. OK.

Mr. LYONS. In terms of a consensus, I am sorry, in terms of a consensus—

Chairman HUIZENGA. Very quickly.

Mr. LYONS —I think that a pilot in the maker-taker is about as close to a consensus that I have ever seen working in the industry.

Chairman HUIZENGA. OK.

Mr. Rubenstein, you talked about 25 years ago starting when phone was it, with technology advancements over the last 40 years from 1975. I mean what should Congress take a look at statutorily, the statutory framework of equity market structure because of that technology?

Mr. RUBENSTEIN. Look, you are right, I mean when I was on the floor of the exchange, we liked to think we were really efficient down there on the floor, but looking at where the markets are now, the amount of intermediation has gone down tremendously, which is why all of the data suggests that we have the most efficient markets in the world that are saving retail investors money, institutional investors money, helps them save for retirement.

But no surprise, right, because technology sort of does that? But—

Chairman HUIZENGA. Does that lead to any kind of statutory framework that we ought to be looking at?

Mr. RUBENSTEIN. Well, I think one theme that is coming out of this hearing already is that while we have this great electronic market that is super-efficient, I think there are areas of disclosure and transparency that need to be improved.

Like, if there are pricing schedules that exchanges have with their participants I think it is really important that brokers that have some sort of agency capacity or in any way, need to disclose all of those pricing schedules so investors can make informed decisions.

Chairman HUIZENGA. OK. I have got 1 minute left and I have 20 minutes of questions, unfortunately, and I would love to get to—Mr. Saluzzi doesn't believe a comprehensive review is needed. Both Commissioners Piwowar and Stein have called for comprehensive reviews, but we can address that later.

NMS plan governance, Mr. Lyons and Mr. Brown, can you discuss the perceived benefits of allowing broker-dealers and asset

managers to have direct voting representation on NMS plan operating committees. If you—very quickly, each.

Mr. BROWN. I would say that the introduction of brokers and asset managers into the NMS governing committees will certainly broaden the expertise that is brought to bear on a policy issue early in that discussion so that it can be pointed in a direction that is better for our markets.

Chairman HUIZENGA. Mr. Lyons, real quickly.

Mr. LYONS. Yes, I would agree in whole part with the suggestion that non-SRO members and the views that they bring, and for us representing the clients, the 95 million clients that we represent, would bring added benefit to those discussions. And to have a seat at the table would be very meaningful for them.

Chairman HUIZENGA. OK. We usually reserve this for the end of the hearing, but we are going to allow for written followup questions. You will be receiving a few from me as well, things I would like to get through, and we just ask that the panel respond as promptly as possible with some of those.

And with that, the ranking member here for 5 minutes.

Mrs. MALONEY. Thank you. That was a good set of questions. Anyway, first of all, this question is for Mr. Saluzzi. There has been a lot of talk about these so-called market-taker pricing, where exchanges pay rebates to brokers who send their orders to the exchange.

Some say that this creates a conflict of interest by giving brokers an incentive to send their clients' orders to the exchange that pays them the highest rebate, rather than the exchange that gives them the best execution.

The SEC's Equity Market Structure Advisory Committee (EMSAC) has recommended that the SEC do a pilot program to test whether market quality improves with lower rebates.

Do you think the SEC should go ahead with this pilot program? If so, who should design the program, the SEC? Or should they delegate this to the Committee of Exchanges, like they did with the Tick Size Pilot Program?

Mr. SALUZZI. Thank you, ranking member. Certainly not the exchanges. I mean, that is like putting the fox in the henhouse, OK. So the answer to that question, I would like the SEC to design a pilot. However, I think the access feed program that is being proposed, or been talked about, falls short of one critical area.

There should be a no-rebate, as we call it, bucket. In other words, the source of the problems, the source of what we are talking about when it comes to fragmentation in various venues, are the brokers. The brokers are routing at various venues to collect higher rebates.

This doesn't make any sense for best execution. Rebates should not be taken into account. So what we think a better model, rather than maker-taker, is a flat fee. Actually, there is one exchange currently doing this, IEX, where they charge on their non-displayed liquidity, 9 mils per share or nine-tenths of a penny whether you make or take.

That collects, for them, 18 mils, which is a nice revenue capture, if you think about it. Based on the other exchanges, their revenue capture, since they have to pay a rebate and collect an access fee,

is closer to 3 to 5 mils. So what I am suggesting is a raise for the exchanges. I think they should deserve more money for matching buyers and sellers.

But rebates are distorters. They are clouding what brokers do. They are putting in unnecessary conflicts of interests. That is just one part of payment for order flow.

There is a second half, which we haven't talked about, and that is where the market makers, who are off-exchange, will buy retail orders from firms like Charles Schwab and others, and they pay for that flow. They pay nine-tenths of a penny, 15 mils, and have it based on the agreement that they have with that broker.

We want to know, why would a market maker pay for order flow? And they are giving price improvement, as Mr. Brown said. Well, obviously, there is a catch here. Market makers want as much order flow as they possibly can, so they can read the direction of the market. But unfortunately, what this does is corrupts the order routing process from the retail broker side.

I will give you one example of one thing that we really can't believe. There are some firms that can mark a retail order, OK, you can have it, identify it, go in through an exchange, and you can get an enhanced rebate for that exchange. In other words, more money, if you are willing to give up the fact that your client is a retail investor.

Now, what does that mean? Oh, retail only trades 100 shares. It really shouldn't matter, right? No, it does. You know why? Because it is not Mr. Lyons' order, and it is not my order representing an institution. And that means a lot.

So what I am saying is, rebates, maker-taker, payment for order flow, these are all the sources of conflicts of interest that we have argued against for many years. So we are happy that the SEC has proposed this, but unfortunately, I think it may fall a little short of my suggestion. Thank you.

Mrs. MALONEY. OK, thank you. Mr. Lyons, you mentioned in your testimony that institutional investors need more and better information about how brokers handle your orders. The SEC proposed a rule last year that would require brokers to disclose much more information about their clients, about how they handle their orders. Your testimony today indicated that you support the SEC's proposed rule with certain modifications.

So my question is, what modifications do you believe the SEC should make to the order handling disclosure rule? Second, what information would you get under the SEC's rule that you currently don't get from your own brokers?

Mr. LYONS. Yes, thank you. We do think that this is an important proposal that should be acted on immediately on behalf of our clients. Specifically, the modifications have to do with the definition of an institutional order. We would really like to make sure that all of our orders are brought in under the program so that we can analyze that data coming back effectively.

The real benefit that we get from the standardized format that has been developed and has really helped to be developed by the ICI in conjunction with other trade associations, who gave it to the SEC as a blueprint, if you will, on how this information could be used, is it allows us to efficiently process and make apples-to-ap-

ples comparisons across brokers and across venues, when it is in a standardized format, and in a way that we can easily digest, in an electronic format that we can process.

Mrs. MALONEY. Thank you. Thank you, thank you, thank you.

Mr. Brown, you stated, in your testimony—oh, excuse me. My time is up. It is such an interesting—

Chairman HUIZENGA. I know.

Mrs. MALONEY. I think we are going to have to have a second round.

Chairman HUIZENGA. The—

Mrs. MALONEY. Sorry. I am sorry.

Chairman HUIZENGA. The chair was going to have a very light gavel. So if the ranking member would like to finish her last question quickly.

Mrs. MALONEY. No, that is OK.

Chairman HUIZENGA. OK. All right.

Mrs. MALONEY. Let us respect the time.

Chairman HUIZENGA. All right. Well, I appreciate that.

So with that, I would like to recognize the vice chairman of the committee, Mr. Hultgren from Illinois, for 5 minutes.

Mr. HULTGREN. Thank you, Mr. Chairman.

Again, thank you all for being here. I want to address my first question to Mr. Lyons, if I could. Your testimony includes recommendations that ATSes disclose information about their operations and operators. You specifically mention preferential access for certain market participants and the potential for conflicts of interest by the operator.

I wonder, can you explain why these disclosures should not be voluntary? Can't you elect to use ATSes that disclose the information that you are seeking? Additionally, doesn't Capital Group oftentimes benefit from these unlit trading venues to execute large trades?

Mr. LYONS. Yes, another great question. So I think that the proposal requires a standardized response for the questions that we asked the ATS operators that we interact with today. We go through a great deal of scrutiny over our brokers, who they route to, and what venues they expose our orders to.

We are very concerned about things like information leakage throughout the process. So there are benefits to ATSes that are unlit. Mostly, those accrue to us in large-block transactions.

But in order to engage in a meaningful discussion, so that our clients are better served as they interact with all these different ATSes, it is important for us to have information about how they operate.

I don't think that disclosing ATS operations is any more of a burden than what the SROs do today. I think in today's market, where they are really effectively competing with each other, why do we need to have separate standards of disclosure between ATSes and exchanges anymore?

Mr. HULTGREN. I think you touched on this a little bit in your answer there, but just to drill a little deeper, can you explain how this interacts with your recommendations for requiring broker-dealers to provide institutional investors with more granular disclo-

sure about order routing activities, and more specifically, what information should this include?

Mr. LYONS. So the real important aspect of the proposal for the order handling disclosure rule is for us to be able to get more detailed information, not only about where our executions are taking place, which we get pretty readily, and it is available through the technology enabled in the markets, but really, how much of our orders are being routed and where they are being routed and are the routes consistent with the success we get with actual executions?

Those are the missing components that we don't get in a real digestible format today that we could really use.

Mr. HULTGREN. Thanks.

Mr. Rubenstein, if I could address you, I appreciated the section of your written testimony discussing cybersecurity. I don't know that this qualifies as market structure, but it certainly is important to market integrity and to investor confidence.

You recommend establishing a better system for sharing information between key stakeholders. I wonder if you could please explain the system that is currently in place and what specific changes you would recommend, and what role the SEC or SROs should or do play in this system.

Mr. RUBENSTEIN. Thank you, Congressman. Well right now, as a member of FINRA, we are frequently audited, and we have to abide by the rules that FINRA has. They have a lot of rules regarding cybersecurity, that firms have to maintain adequate safeguards to prevent hacking and other types of cyber theft.

But because of the sensitive nature of cyber issues, the industry, I feel, has been really hesitant in banding together and sharing sensitive information, like when one firm has to deal with a cyber issue, they learn something. That information needs to be shared with other stakeholders in the industry.

So that would be my suggestion, is that folks in the industry get together, and we actually mandate that they get together and have this discussion, so obstacles that are encountered can be lessons learned for everybody else.

Mr. HULTGREN. Thanks.

A couple of you have mentioned in your testimony that the SEC should renew its Equity Market Structure Advisory Committee. I have generally received positive feedback regarding the work of the committee. But as is the theme of the hearing today, I wonder if there are opportunities that we can find improvement there, as well.

Mr. Brown, I wonder if I could address the last couple of questions to you. Do you believe that EMSAC is the proper representation of market participants and policy experts? Do you believe EMSAC's work and recommendations are being made use of in a constructive fashion?

Mr. BROWN. Well, thank you, Congressman. The EMSAC is a valuable tool for the SEC to probe the issues that confront it. I will have to say that we were disappointed in the original makeup of the EMSAC, because we felt that a firm that served retail investors was not included in the makeup of the committee.

As well, we joined with two of the largest exchanges to write a letter to the SEC, urging them to make modifications, because we

felt that that was something that could really add to the benefit of the EMSAC.

So I would hope, as they look at that makeup, coming—as it expires in August, and may get reconstituted, they would consider that a retail firm and the listing exchanges would be included.

Mr. HULTGREN. Thank you all again. I have many more questions, but we have got limited time.

I yield back the balance of my time.

Chairman HUIZENGA. The gentleman yields back.

With that, the chair recognizes the gentleman from Massachusetts, Mr. Lynch, for 5 minutes.

Mr. LYNCH. Thank you very much. To begin with, Mr. Chairman, I just want to thank you, and congratulate you on putting together this hearing with these two panels. This is really an all-star group, and I really appreciate your good work and the good work of Ranking Member Maloney.

Mr. Saluzzi, I know that you have been working on a lot of issues to democratize the markets, and yourself, and your business partner, Sal Arnuk over at Themis. They have been doing a great job.

The essence of a properly functioning market includes a pricing mechanism so that when prices fall too far there will be new buyers coming into the market, and it re-establishes an accurate equilibrium.

But what you have described in your book—and I actually read "Broken Markets," thank you very much, and also to Mr. Arnuk, when you put things in, like, the maker-taker incentives, the rebates that are going on there, colocation that Mr. Lewis described in his book, also payment for order flow and special order types, all of that is an encumbrance on a properly functioning market.

Now, last session, I sponsored the Maker-Taker Conflict of Interest Reform Act, and I know I sent it over to Mr. Arnuk. I am not sure if you got a copy as well. But the legislation would require the SEC to carry out a pilot program, such as Mr. Lyons has suggested, and I think Mr. Brown has mentioned, to create an alternative to the maker-taking pricing model, and see what happens.

Just take a group of stocks and remove the incentives other than the best price for the customer. Did you have a chance to review that at all, or have any thoughts on that?

Mr. SALUZZI. Congressman, thank you, and yes, I did. Thank you for introducing that bill. I think you were before the EMSAC's committee on their proposal. Yours was 2015, I believe. So that is exactly what we are talking about.

However, we are afraid of unnecessary complexity again seeping into the market. Some of them on the EMSAC are proposing multiple buckets, they call it, in these pilots, similar to what we have in the Tick Size Pilot. That is where more complexity starts to breed.

I think we can do something when it comes to rebates and maker-taker in a more simpler form, as I mentioned earlier, with a flat take-take fee. But you also mentioned a couple of other really good points when it comes to order types, proprietary data feeds. This whole maze and this whole web that we are describing, we referred to it as a Rube Goldberg machine years ago.

The order—here is the buyer and here is the seller. They should be really easy to match up. But instead they have to go through this crazy mechanism called the United States stock market. We can match up buyers and sellers. We need less intermediation. And what we have now is more intermediation, and we think it is unnecessary.

Some of these things which causes more intermediation are these order types. Let us just take that, for instance, a special—for instance, one of the exchanges, a couple of years back, was fined $14 million because they did not display, or did not disclose certain order types behavior.

Fourteen million dollars is a significant fine by the SEC to a United States stock exchange. The reason being is that some clients can take advantage of those order types, while others can't. So just to—and I don't want to get into the weeds too detailed, but I wanted to read one quote.

There was something that NASDAQ recently had out, called a post-only order. OK. That order is—they changed the way they basically designed it. It is supposed to not interact with a current hidden order. So you can place a hidden order, you can place a displayed order. Why would they do that? Because they don't want to incur the access fee.

So NASDAQ recently changed it and said you know what? Actually, we were giving away information on those hidden orders because the post-only would slide down when it ran into a hidden order. Was that by design or by accident? I don't know. But for 7 years that went on.

Information leakage in the order types through the proprietary data feeds was going on. This is what causes problems in the United States stock market.

Mr. LYNCH. Right.

Mr. SALUZZI. These are the issues that are really in-depth.

Mr. LYNCH. All right. Thank you for that explanation. I wanted to talk a little bit about dark pools. We recently had a case this year, January 2017, where the high frequency trading firm Citadel was fined by the SEC about 22 million bucks for misleading brokers who sent them retail orders.

Citadel had promised to give them the best price. Instead they referred the trades to dark pools. It turned out they weren't getting the best price for their clients. What is the best way to introduce some transparency to the dark pool situation?

Mr. SALUZZI. Well, again, that situation was based on two sets of data, right? There is one set which is run by the SIP, or the Security Information Processor, and then—

Mr. LYNCH. Right. That is the slow feed, right?

Mr. SALUZZI. That is the slow feed.

Mr. LYNCH. Yes.

Mr. SALUZZI. And then there is the other fast feed. That is the direct feeds that anybody can purchase from an exchange and then collect, basically consolidate them all to build a faster quote.

So the Citadel case was basically they were seeing one quote and giving the client a fill on an inferior quote. What is interesting about that is they pay for that order flow again, right, like we talked about before. But if you go back to 2004, Citadel actually

wrote a comment letter, urging the SEC to ban payment for order flow. They said it distorts order routing decisions, anti-competitive and creates an obvious conflict of interest.

Mr. LYNCH. Right.

Mr. SALUZZI. Well, what changed in the last 13 years that now makes it acceptable?

Mr. LYNCH. Right.

Mr. HULTGREN [presiding]. The gentleman's time has expired.

Mr. LYNCH. I thank the chairman for his courtesy. Appreciate that.

Mr. HULTGREN. The gentleman's time has expired.

Gentlewoman from Missouri—

Mrs. WAGNER. Thank you.

Mr. HULTGREN —Mrs. Wagner is recognized for 5 minutes.

Mrs. WAGNER. Thank you, Mr. Chairman.

And thank you all for appearing today to discuss issues relating to equity market structure and developments that have come about over recent years due to technological advancement and regulation.

As many of you all have said, the U.S. equity market is indeed the most efficient and the most competitive in the world, allowing companies to raise capital to create jobs and grow their business. Additionally, improvements in market structure have made it easier for what I would call ordinary investors to access the market and trade, which is something I would like to first start with.

Mr. Lyons, and also Mr. Brown, in what ways have both institutional and retail customers benefited from advancements in U.S. equity market structure?

Mr. Lyons?

Mr. LYONS. Yes. Thank you, Congresswoman. You know, again, as I said before, certainly with Reg NMS, there was a lot of friction taken out of the system around access to the markets in real time, which was an important point of Reg NMS going into it.

So it allows us, as a buy-side trader representing the interests of our 95 million clients, that the regulated funds actually have interest in, it allows us more control over the order process and allows us to get better outcomes for our investors.

You know, the U.S. equity markets are as liquid as any markets or more liquid than any markets we trade in. My vantage point, in trading around the globe, in every single market around the world, we see really favorable outcomes for our investors transacting in the U.S. markets.

Mrs. WAGNER. Mr. Brown?

Mr. BROWN. Yes, I think we have to go back to the context of when NMS was created. Remember, at that point, we still had a manual market. The New York Stock Exchange operated manually.

It took minutes to understand where your trade stood—so there is no question that retail investors, in the 12 years that have elapsed, now have instantaneous access at executions between the spread. So there are tremendous advancements there that have inured to the benefit of—

Mrs. WAGNER. But to that point, Mr. Brown, the R&D, I guess, the increased levels of trading automation and faster execution speeds over the last decade, are they attributable to Regulation NMS?

Mr. BROWN. I wouldn't necessarily say that they are attributable solely to NMS. The technology has improved. The use of algorithmic trading has developed, and it has allowed for innovative approaches to trading that has really created these deep, liquid and best markets in the world.

Mrs. WAGNER. In addition to the innovation and the access for the retail investors, have investors benefited, would you say, or been harmed by these developments? What would be your assessment?

Mr. BROWN. There is no question. I think one of the comments earlier was about where we have consensus. I don't think anyone would argue that retail investors have it the best they have ever had it at this time, and because of the way the markets have developed.

Mrs. WAGNER. OK. One of your big concerns has to do with this, the market data system that is—

Mr. BROWN. Well, that is—

Mrs. WAGNER —decades and decades old. Would you care to expound a little bit?

Mr. BROWN. Yes, now you have touched on a subject where there is a concern.

Mrs. WAGNER. That is right.

Mr. BROWN. We have an antiquated structure that governs the market data system. We have a securities information process, there are really two of them, that produce a slower data feed than what is available professionally and through the proprietary data feeds from the exchanges. Those are too expensive to be able to show our retail clients, and we are required, by rule, to purchase the market data from the SIPs.

Now, it is an interesting dynamic, because it is like having a business where the broker-dealers have to give the raw materials to a company, by rule, and then by rule we have to buy back the finished product. That is a great business if you could be in it.

You have guaranteed profits. But that has to change. It is time to modernize our market data system.

Mrs. WAGNER. All right, great. Switching quickly here to how equity market structure affects capital formation, can you describe how market structure impacts capital formation? Does the current structure impede or facilitate capital formation?

Mr. BROWN. Well, that is—again, there is a complex subject. The—

Mrs. WAGNER. You have got 7—

Mr. BROWN. Yes. Yes—

Mrs. WAGNER —seconds, Mr. Brown.

Mr. BROWN —it is a very complex subject. I would just simply say, the regulatory scheme that overrides corporations in making a decision, do I want to become public, is really an impediment to the growth of new corporations, new public companies.

Mrs. WAGNER. Sadly, my time has lapsed.

I thank you, Mr. Chairman, and I look forward to submitting the rest of my questions in writing. Thank you so much.

Chairman HUIZENGA [presiding]. It is the difficulty of the format, all in 5 minutes. It is a challenge.

So with that, the chair recognizes Mr. Foster of Illinois for 5 minutes.

Mr. FOSTER. Thank you. And thank you, Mr. Chairman, for convening this.

Mr. Brown, you mentioned SIP technology improvements. Is there any reason that this should not be pursued really aggressively? For example, are the high-frequency trading companies (HFTs) unlikely to use the SIP in any case because they prefer the proprietary—who would be against a rather aggressive improvement in SIP technology?

Mr. BROWN. I think you will hear in the next panel that they will say that SIP improvements have been made. But why was that? Because the SIPs failed. When the SIPs fail, all trading ceases. Well, that is a real problem.

Now, how long before the SIP fails again? I don't know, but the fact is, exchanges and the members of the NMS Plan Governing Committee that oversees the SIP are never going to make the SIP so good that it would cannibalize the proprietary data feeds which they sell.

I mean, there is a conflict. How would you ever—why would you ever do that? So it will always remain a second-tier product. Now, it can be improved dramatically. You could add depth of book to the public feed. We have to buy it. Why wouldn't we be allowed to see multiple levels of data within that public feed? I think that is an important improvement.

The latency has been narrowed, but it could probably be narrowed further. So all in all, I would recommend it be pursued further. I think your question is right on, sir.

Mr. FOSTER. Now, there are two very impressive facts that have been quoted here with the Vanguard number of the 30 percent increase in your value at retirement for your typical mutual fund. Is that really a widely accepted—has there has been a real improvement from the point of view of the long term. So no one would take issue with that.

The other one is at the other corner, there is the ma and pa trader, who have obviously been getting a much better deal. That is, at least in part, I understand, affected by the payment for order flow.

Is it a correct understanding of mine that actually ma and pa traders get a better deal because people are willing to pay for their order flow? Or is there some asterisk on that statement?

Mr. BROWN. No. That is pretty accurate, because ma and pa trades, trades from retail investors, have an inherent value. There is less risk associated with them, because there are not 100,000 shares—

Mr. FOSTER. You know you don't have Jim Simons on the other end of it?

Mr. BROWN. Yes.

Mr. FOSTER. All right.

Mr. BROWN. Yes. So there is less risk. So a trader will be willing to provide a payment for order flow in order to attract those types of orders. Now, in so doing, and like the courts and the SEC have recognized, a firm that sends order flow in return for payment, has an obligation.

One, you have to make sure that you disclose all the payments you are receiving. Second, you have to ensure that you obtain best execution. Best execution can be measured by execution quality, and that is what we do at Schwab. It is really critical for us.

Our clients, on average, receive a quarter of the spread in price improvement, versus if the same size order were sent to an exchange, on average, they would get disimprovement. It would be traded outside the spread. So we believe there is no question that that is best execution, and so do the regulators.

Now, I think that further disclosure is a good idea. Maybe there are ways to make it plain English so clients would understand better what is going on. But I think, overall, we are fully supportive of that system.

Mr. FOSTER. All right. Any other comments from anyone?

Mr. SALUZZI. If I may?

Mr. FOSTER. Mr. Saluzzi.

Mr. SALUZZI. OK.

Mr. FOSTER. Go ahead.

Mr. SALUZZI. I think that is interesting what Mr. Brown says, but all of his orders are being sold to various market makers, including limit orders, which I don't understand why a non-marketable limit order would be sold to a market maker when it could be posted on an exchange, but it is a different point.

But the Citadel case that we described before shows that there are two sets of data. So not every time is mom and pop getting the right set of data. In other words, that SIP quote that they are looking to buy at the market may not be getting the price that they are getting. But that is just one point.

The second point is retail, we all talk about it, and I agree, 100 shares of—you want to buy AT&T? No problem. Put it through your retail account you will be fine. But retail also represents—if everyone has a pension fund, or a 401(k), or I have a 529 for my kids, I have been saving for their college for the last 15 years, well, that money is an institutional level.

So that means I am a retail investor being represented by an institution, so I don't think we have to just say retail has never had it better. How is that the institutions are doing? I think Mr. Lyons explained quite a bit of a conflict when it comes to order routing and various other things going on in the market. Thank you.

Mr. LYONS. Yes. I would just add one comment, and that is the premise that Vanguard has made in regards to their results in response to Reg NMS. For the Capital Group, which is who I work for, as we have looked at our transaction costs, implicit costs, explicit costs have come down certainly, but implicit costs haven't really come down as much as people would have suggested, from our own data.

Specifically, when we look at the data, we attribute more of the reduction in explicit costs to decimalization, certainly, that happened, and also increased electronic access to the marketplace, which is a lower price way to access.

Mr. FOSTER. All right, thank you.

And my time is up.

Chairman HUIZENGA. The chair recognizes the gentleman from Arkansas, Mr. Hill, for 5 minutes.

Mr. HILL. I thank the chairman. Appreciate this first panel, and just makes me always—when we talk about the subject, I always feel old, because one of my first jobs in a brokerage company in the 1970s was typing confirmations using carbon paper. I will explain to the staff what carbon paper is after the hearing.

So we have gone from member-owned cooperative exchanges now to for-profit exchanges, and these alternative trading venues. I have really enjoyed listening to the discussion. But one thing that I think there has been a lot of discussion in Congress on, and at the SEC, but no change in the last few years, is this issue of governance now of the markets.

So, Mr. Lyons and Mr. Brown, could you talk a little bit about the benefits of having asset managers or broker-dealers, people from the brokerage community, serving in the governance model overseeing NMS?

Mr. LYONS. Yes, so I think that having representation of the millions of people that we have our best interests aligned with is additive to the process. And I think specifically, as an example that was just brought up, is the conflict of interest in, for instance, the SIP operating committee.

I think that when you have for-profit exchanges who are controlling the pricing mechanism around the SIP, and there is no disclosure at all around how those revenues are spent, how they are allocated, what the investment in technology is.

I think that that is a perfect example of having someone outside of the SROs, onto these governance plans would add a level of transparency that would help along the process and maybe inhibit some of the conflicts.

Mr. Hill and Mr. Brown, when you were talking about market data and you talked about modernization, could you go deeper and step away from the buzzword, and tell me specifically what you mean by modernization? What does that mean to you?

Mr. BROWN. Well, with respect to market data, it would mean changes to the feeds that would allow for more information to be available to public investors, retail investors. As I mentioned, the adding depth of book to the SIP feed would be a change.

This isn't something that is new. We have been advocating for this for many years. In fact, I was reading one of the Reg NMS adopting releases, and I am quoted in there talking about how the market data system needs to be repaired. It shows you how long I have been talking about the same things, with little effect.

But what I really would say is that the system, as structured—and this really goes back to a structure created in the 1970s, it locks us into a certain system. There is no innovation.

The innovation has occurred outside of the SIP. The proprietary data feeds are much faster, much more in-depth. They are very effective in providing information.

But if we are going to have a public feed that the industry has to purchase, it ought to be maintained at higher levels than it is. And that is not the case.

Mr. Hill I am also interested—we have had a lot of conversations since I have been in Congress about exchange-traded funds (ETFs), and in fact, public policy has, I would argue, encouraged people to

ETFs as if they are superior to any other decision that an individual investor might make about asset allocation.

Clearly, one of the concerns, as Mr. Lyons talked about, is the impact on retail investors who invest through a collective process.

Could somebody reflect, talk a little bit, maybe Mr. Rubenstein, talk about the impact of these challenges on governance and NMS and the impact on the ETF market, exchange traded fund market?

Mr. RUBENSTEIN. Thank you, Congressman. Well, certainly, ETFs bring enormous efficiencies to all types of investors, both retail and institutional. However, there has been such a huge adoption recently of ETFs, and we have seen a tremendous rotation from some more actively managed portfolios to passively managed portfolios that involve ETFs.

But there hasn't been a tremendous amount of volatility in the market since this rotation has happened. So in some ways, the markets are a bit untested, given all of the amount of assets that have gone into the ETFs, and it is definitely something that we should talk about, to make sure that industry participants are prepared for potential volatility in those instruments.

Mr. HILL. Yes, Mr. Chairman, I just think this is really an accident waiting to happen with the way we are driving people through public policy decisions to ETFs as if it is a sanctuary of low risk and unlimited upside. So I yield back. Thank you.

Chairman HUIZENGA. Gentleman yields back.

With that, the chair recognizes Mr. Scott of Georgia for 5 minutes.

Mr. SCOTT. Thank you very much, Mr. Chairman. Our equity market structures play such a very pivotal role in our total economy. I think it is important to establish that our capital markets of the United States is the greatest, in terms of competitive advantages to the world. Trust in our markets to work effectively is what attracts investments from across the world to the United States.

I want to repeat that. Trust in our markets to work effectively is what attracts investments from across the world to the United States. This is what makes our Nation No. 1.

I think that is why this hearing here today is so important, to study the evolution of our equity market structure and to search out and get recommendations from your panelists and this committee—how we can all work together to improve it.

This is indeed a complex subject matter. Everyone basically wants a fair, more transparent, open market. But we want this because improved markets results in better execution of trades. Better execution of trades means better prices, which saves money for the everyday people.

So keeping that in mind, to our American people who may be watching this hearing, to those who are saving money for retirement or saving for the down payment to buy a house, I simply want to ask this panel how Congress should prioritize any changes to the market structure?

I will take—why don't we go down the line? What I am asking for here is, it is important for us to keep our Nation strong, to keep our Nation's financial system strong, to keep us No. 1.

The fundamental question is, because you all are very distinguished, what can you tell us, as Members of Congress, that we

need to do to keep our Nation strong and having the strongest financial economic system on the planet?

Mr. Lyons?

Mr. LYONS. Yes, Mr. Scott, thank you. I think that, importantly, the Congress can encourage the SEC to continue down the road of looking to create opportunities for our system to be even better. I do agree that we have the most fairest, most efficient, most liquid, most competitive markets in the world, and I think it serves our economy and our citizenry very well.

However, as I have explained, there are conflicts of interest in the market that we think can be addressed. We would really like and hope that Congress can push the SEC to address some of those conflicts as we described earlier.

We also think that the proposals that the SEC has made over broker disclosure routing and ATSes are an important component for regulated funds like ourselves to monitor and evaluate the execution quality we get on behalf of our clients, which lead to better investment outcomes, as you suggest.

Mr. SCOTT. Yes.

Mr. SALUZZI. Thank you, Congressman. I can't agree with you more that trust and confidence in our markets are the most important thing we need. An old friend of ours, Senator Kaufman, used to always say, fairness and transparency is the key here. I agree.

What doesn't give me trust and confidence is when I see major dark pools, or ATSes getting fined multimillion dollars, when I see a stock exchange getting fined millions of dollars for various behaviors or certain high frequency trading firms also getting fined.

So I think what is missing here, a critical link, is proper surveillance. That goes back to the SEC. In an attempt to fix that, they have recommended a consolidated audit trail, which is now being built, but it falls short in one key area. It only covers the stock and options market. It doesn't cover the futures market, because that is the Commodity Futures Trading Commission (CFTC). They need to talk to each other.

Mr. SCOTT. Absolutely. Something that I am not sure where the people watching us this morning is quite aware, but I think that I want to bring to the attention of this committee, that according to information that I have received, trading at traditional national venues like the New York Stock Exchange has gone down. That worries me. I see my time is up though.

Mr. SALUZZI. If I can, a real quick step, prior to NMS, 80 percent of share was done at the New York Stock Exchange, of their listed stocks. Now it is less than 25 because of the fragmented maze of liquidity that has been created, mostly due to Reg NMS.

Mr. SCOTT. Yes. Thank you, sir.

Chairman HUIZENGA. The gentleman's time has expired.

With that, the chair recognizes the gentleman from Minnesota, Mr. Emmer, for 5 minutes.

Mr. EMMER. Thank you, Mr. Chair. I want to thank Chair Huizenga, for calling this important hearing, and thank you to the witnesses for being here today. I will try not to cover the same ground, but I do have some questions that relate to some of the things that you have been testifying to this morning.

First, Mr. Lyons, in your opening statement, I wrote it down, you said, "Our equity markets are fair and the most efficient in the world." But then you went at the end of your testimony and said, "There are three areas that we really need to be concentrating on, the maker-taker, self-regulatory reform, the SROs, lack of transparency of broker dealers in the ATS." It was all about conflicts of interest.

I think that seemed to be a theme that developed on the panel. Mr. Brown, you also talked about that in your opening statement.

I guess the question I would like to open with is for you, Mr. Lyons, and I might spread it down the row. Can you give us an example, a specific example, of the conflict of interest that you are talking about? And any one of the three examples that you have given are the three areas, it would be helpful.

Mr. LYONS. We do a lot of analysis on how our orders are exposed to the marketplace. Again, as someone who works for an active manager who spends an enormous amount of resources doing fundamental analysis trying to uncover hidden value for our investors, how we implement those decisions in the marketplace are paramount to them receiving the benefits of that work we do and to maximize the returns that they can get.

As we transverse the complex marketplace we have today, it is important for us to understand who sees our orders, where information leakage might be happening, how ATSes operate in an environment.

When we look at the results of our analysis, we have questions for the broker-dealers that we do business with, specifically why are we routing to this venue that seems like we don't get very much volume into?

Or I see that my execution quality on one exchange that charges a maker-taker fee might be widely different from another exchange that charges an inverted maker-taker fee.

So bringing to bear the reasons that people are routing the way they do is an important aspect of what we do, and that is why I think disclosure is a good way to get over that potential conflict that they have.

Mr. EMMER. Mr. Brown, do you have anything that you would add to that? Any specific examples?

Mr. BROWN. We have heard this morning about payment for order flow. Clearly that is a potential conflict and it is one that at Schwab we look at very closely, and we then take steps to mitigate that conflict.

For example, our execution partners, we require them to charge us or to pay us the same amount per order. We don't want to have any incentive to route to one or another based on a higher payment. That just doesn't happen.

And then second, we really monitor our execution qualities so that we can be certain that our clients receive best execution when they are getting an execution from one of these vendors, because otherwise our conflict would be insurmountable. But that is not the case.

For example, in the first two quarters of this year, our clients have earned $70 million in price improvement through this struc-

ture, whereas the payment for order flow is about $7 million. So you can see—those are just market orders.

The fact is we really do believe that this is a better system. And that payment for order flow is then reinvested back into our business to give our clients better trading tools, better services, better systems and ultimately, lower commissions so that they can trade.

Mr. EMMER. Just so you know, as we go forward, people like me, we are going to need more specific examples because both of you have just told me, the way I heard it, how you are self-policing.

You are seeing these issues and you try to address them in the marketplace. I don't know if that is happening. We need to know where and what policy will help drive better results.

Mr. Saluzzi, very quickly because I have a short amount of time, I—and maybe I will send this to you later because I want to ask Mr. Rubenstein something about SIP fees versus direct fees in the 20 seconds I have left, but you said we should be questioning the role of academic study. Maybe you and I can connect after and talk about that?

SIP feeds versus direct feeds, quickly, Mr. Rubenstein?

Mr. RUBENSTEIN. It is extremely important that we have investor confidence. That is why we are all here in this room today. Investors use the SIP feed because it is the least expensive option. The SIP has improved dramatically in the last few years, but there is more work to be done. There are a lot of proposals on how we can make it even more accurate.

Mr. EMMER. And maybe I will—

Mr. RUBENSTEIN. And I think we should consider that.

Mr. EMMER. I see my time has expired. Maybe I am going to have to followup with you, as well, after.

Mr. RUBENSTEIN. My pleasure.

Mr. EMMER. Thank you.

Chairman HUIZENGA. The gentleman's time has expired.

With that, we go to the gentleman from Ohio, Mr. Davidson, for 5 minutes.

Mr. DAVIDSON. Thank you, Mr. Chairman. I would like to thank our panel. I really appreciate your written testimony as well as the comments you were able to provide, very good insights into this situation. One area that I didn't get a lot of reference to, I hear a lot of reference to liquidity, specifically a lot of reference to liquidity talking about high-frequency traders.

There is this dispersion of exchanges. One of the things, and I would like if you could each comment briefly about the challenge for liquidity for small-cap firms. Liquidity for companies like Apple or AT&T—no problem.

But companies that are trying to enter publicly traded ways to grow, which is part of how our country really built and thrived, was helping entrepreneurs scale their companies and stay in control of them at some level, versus selling out to private equity or just the other parts of the M&A market.

This path seems to almost be closed. We have added to it with lots of regulatory burden, but this dynamic of liquidity, if you could comment on.

Mr. SALUZZI. Thank you, Congressman. I think it is an excellent question, and I think it goes to the heart of the Tick Size Pilot that

has been approved and is currently implemented. All stocks are not equal and this is a very important point.

It is not a one-size-fits-all market. So you may have a small-cap company that is doing great and they are growing and so on, but they don't fall under the radar of a large investment manager. So they are trying to get their self known and maybe they are looking for analysts to cover them, but nobody wants to make a market in that stock anymore because it is not profitable.

So the Tick Size Pilot came out and said how about if we widen the tick to a nickel and see if we can encourage real liquidity providers to come in to support the name? Now, the facts are still not known in the Tick Size Pilot. As much as the industry wants to say it is a failure, I don't believe that is true.

I think it is starting to work, but what is happening is you have to change behavior amongst traders like myself, which we have adopted to it very easily, but there are a lot of broker algorithms, because most people—I am a dinosaur in a sense that we are still trading. I am still a human covering accounts. When I am not here, I am hitting keys at my desk. I am a practitioner.

But what happens is, there are a lot of algorithms out there and they haven't figured out that you can go in there for more size. There may be more liquidity. Instead, what they do, the average trade size in the United States, which trades 6 billion to 7 billion shares a day, is 200 shares. That is lit or dark.

So that is a very small amount. What needs to happen is behavior will change, and I think it will and it will prove that the Tick Size Pilot could help those small-cap companies.

Mr. DAVIDSON. Thank you, Mr. Saluzzi.

Mr. Rubenstein?

Mr. RUBENSTEIN. Thank you, Congressman. I am glad you brought this subject up because the number of initial public offerings (IPOs) has gone down tremendously in this country over the last 10 years and 20 years. Certainly increasing the amount of liquidity for small and mid-cap companies would help, and it will be interesting to see the results of the Tick Pilot.

But when we are also—there was a theme in this room talking about the maker-taker pricing schedule and we are all for taking and looking at the data-driven approach to see how we can make our markets more efficient.

But the fact of the matter is, if you remove rebates from the market, you will remove liquidity for small and mid-cap companies. You will remove lit liquidity in the markets. So if we start attacking the maker-taker pricing schedule, it will run contra to the Tick Pilot Program.

The other thing that we have to keep in mind if we are trying to increase liquidity in small and mid-cap names, is making sure the closing auction remains centralized at the primary exchanges.

There is talk now of fracturing that close. Public companies have spoken out and they have said that—especially small and mid-cap companies—that they want their close effected by the primary listed venue. We should pay attention to them.

Mr. DAVIDSON. Thank you. I would like to change topics. I apologize for cutting off, but time runs fast on this thing. So a lot of talk on this consolidated audit trail, Mr. Saluzzi probably most acutely,

but one of the things that strikes me is these exchanges are selling data.

They have the data. There is a whole commodity market for it, effectively. Isn't this the exact same data that we are trying to get from the consolidated audit trail?

Mr. Brown?

Mr. BROWN. Yes, Congressman, you are absolutely right. That is one of the troubling things about not having broker-dealer participation in an NMS plan developing the consolidated audit trail is that what is going to be the use of that information once it resides within the exchanges?

It is for regulatory purposes but will it also be used for business purposes? We have no confidence whatsoever that that isn't the case, and we won't know until this rolls out. So it is a real concern.

Mr. DAVIDSON. I thank you all. My time is nearly expired. I really look forward to digging deeper into the topics.

Mr. Chairman, I yield back.

Chairman HUIZENGA. The gentleman yields back.

With that, the chair recognizes Mr. Hollingsworth of Indiana for 5 minutes.

Mr. HOLLINGSWORTH. Good morning. Thank you, Mr. Chairman and thank the distinguished panelists for being here this morning. I have really enjoyed and appreciate the dialog.

I wanted to ask Mr. Brown a question, something that you said earlier I wanted to come back to. You had mentioned that in routing to an exchange, all too frequently the quality of execution declines dramatically as opposed to maybe other methods by which you would fulfill that order.

I think you mentioned specifically being outside the spread when on occasion you can make up some of the spread by routing it differently. Tell me a little bit about that and why there is such a discrepancy between quality of execution?

Mr. BROWN. Well, the whole execution structure that has developed, really since Reg NMS, is one that is recognizing that the less risk of a retail order.

Mr. HOLLINGSWORTH. Yes.

Mr. BROWN. And so firms compete aggressively to attract those orders in order to trade against them and then they can make some profit. The client gets a tremendous execution—

Mr. HOLLINGSWORTH. Right.

Mr. BROWN —over a quarter of the spread, on average, and we get a payment for order flow. If you turn that value, you could eliminate payment for order flow, and we wouldn't change our routing practices because they still are going to be competing and trying to utilize the inherent value in a retail order.

If you send it to an exchange, who sits at the bid offer in exchange? Professional traders. They are going to benefit, or they are going to—the exchanges don't want to compete by driving to a better price.

They would rather be able to keep their bid offer and allow the retail customer to really pay more, transfer wealth from retail investors to the professional.

Mr. HOLLINGSWORTH. Right.

Mr. BROWN. That just doesn't make sense in our view.

Mr. HOLLINGSWORTH. Right, and how have you, maybe over the course of your career, but maybe even more recently in the last decade, how has the delta in execution quality between exchanges and other order routing or order fulfillment, tell me how has that changed over time? Has it gotten narrower or has it gotten larger or has it stayed roughly the same? And if so, what is driving that in either direction?

Mr. BROWN. Well, I would argue that it is widening.

Mr. HOLLINGSWORTH. OK.

Mr. BROWN. And it is because the internalizers, so to speak, who are our execution partners, are competing aggressively to attract flow. And it is a—

Mr. HOLLINGSWORTH. And what is keeping the exchanges from trying to compete with them today?

Mr. BROWN. Well, they have come up with ideas. They—

Mr. HOLLINGSWORTH. Yes.

Mr. BROWN. There was an idea in the New York Stock Exchange to have a midpoint execution. And yet when you seek it out it may not be there, and then it is too late. You are going to trade on the bid or offer.

So there should be competitive reactions by the exchanges—

Mr. HOLLINGSWORTH. Right.

Mr. BROWN —rather than an example of something like trade-at—

Mr. HOLLINGSWORTH. Yes.

Mr. BROWN —which trade-at is a watch word for let's force by regulation order flow back to the exchanges.

Mr. HOLLINGSWORTH. Yes.

Mr. BROWN. Let's use regulation rather than competing on price. Let's use regulation to compete. We really take exception to that.

Mr. HOLLINGSWORTH. Well, I know you have talked a lot about data and some of the proprietary fees that come from the exchanges and some of the concerns that I think have been expressed by everybody about—how do I want the control that they have over that.

Would you say that the lack of narrowing in execution quality is reflective of the lack of competition that exchanges are being pressured with as opposed to the other order routing methods?

Mr. BROWN. Well, certainly there is a pressure on them, because, as Mr. Saluzzi mentioned, the New York Stock Exchange volume went from 80 percent of their listed securities into the mid–20s. So they want to do something to drive that back, and if they can't do it by competing on price—

Mr. HOLLINGSWORTH. Yes.

Mr. BROWN —they will do it through regulation.

Mr. HOLLINGSWORTH. Right. Fair enough.

Mr. Rubenstein, you had talked a little bit earlier, and I know previous Congressmen touched on this, but just to come back to it, what do you hear from large public companies, from investors or from pre-IPO companies about their specific concerns with regard to market structure and how that might impact the liquidity in their trading, in their stock? How it might impact their IPO?

Can you tell me a little bit—we talked a lot about the decline in IPOs, the decline in the number of public companies. There are a

lot of reasons for that, many of which are discussed in this committee. But what specifically about market structure concerns people?

Mr. RUBENSTEIN. Well, I think there are three items. Thank you, Congressman. The first is they certainly recognize how innovative technologies have made the markets more efficient. They made them more fair, more transparent.

Mr. HOLLINGSWORTH. Right.

Mr. RUBENSTEIN. We are saving investors money when they trade, as we have heard. This is a big theme today.

Mr. HOLLINGSWORTH. Sure.

Mr. RUBENSTEIN. They are also interested in understanding the markets better and we are happy to use some of the quantitative tools that we use to build our trading algorithms and help them understand the markets with those tools.

Mr. HOLLINGSWORTH. Right.

Mr. RUBENSTEIN. And the third thing is—one thing that has come back is by far the most important thing to them is—that their closing auction, as I mentioned briefly earlier, is conducted by their primary listed—

Mr. HOLLINGSWORTH. Yes.

Mr. RUBENSTEIN —venue. It is the most important trade of the day.

Mr. HOLLINGSWORTH. Right.

Mr. RUBENSTEIN. It is the trade that mututual funds, hedge fund portfolios are marked to, that everyone's retirement accounts are marked to, derivatives transactions are marked to, and they don't want to see it fractured—

Mr. HOLLINGSWORTH. Yes.

Mr. RUBENSTEIN —amongst Wall Street firms. Thank you.

Mr. HOLLINGSWORTH. Understood. Thank you so much.

I yield back.

Chairman HUIZENGA. The gentleman yields back.

With that, the chair recognizes the gentleman from Maine, Mr. Poliquin, for 5 minutes.

Mr. POLIQUIN. Thank you, Mr. Chairman, very much. I would like to yield 20 seconds to my associate, French Hill from Arkansas.

Mr. HILL. It is summer and everybody here, it is a good crowd, Bruce, everybody wants to go to Maine. We have Maine travel brochures here. The small blueberries, the lobsters, this will just save time because this will let Bruce have more time to ask his questions. I yield back.

Mr. POLIQUIN. Thank you. I reclaim my time. Thank you very much, Mr. Hill. I am a huge advocate for the State of Maine. I know all you folks here who have not booked your Maine vacation, remind you that there still is time. We do not use the air conditioning in the State of Maine. We don't need it and we do have plenty of—

Chairman HUIZENGA. The chair is tempted to dock you 30 seconds for the advertisement, but—

Mr. POLIQUIN. Prefer that you add that 30 seconds back on, Mr. Chairman, but if you don't, I will understand. Thank you very

much. I appreciate all you folks being here today. I represent rural Maine, not the urban areas that we have.

We are very proud of our hardworking families and we have thousands and thousands of small businesses in the State of Maine and folks that are trying to save for their retirement and also for their kids' college education.

Now, there is roughly $24 trillion in our economy here in the states of our retirement savings and a lot of you folks here are responsible or, in part, play in that space.

Mr. Lyons, one of the concerns I have for those folks that work in this space, that help our families in Maine and throughout the country save for their retirement, is to make sure that when a trade is executed on behalf of your clients through some of these other folks in the space, that the retail investor gets the best price at the lowest cost such that the rate of return will be the greatest, such that they have the biggest nest egg humanly possible so they can enjoy their golden years.

Now, could you do me a favor, sir? Could you walk us through a large institutional trade that would be conducted on behalf of one of your funds? What does that look like, and maybe point out some of the problems, if there are any, that you run into in that process?

Mr. LYONS. Thank you, Congressman Poliquin. As a matter of fact, the Capital Group has, as part of their investors, over 30,000 individuals from your district, representing over $1.5 billion in assets—

Mr. POLIQUIN. Thank you.

Mr. LYONS —so it is pertinent to you.

Mr. POLIQUIN. Thank you.

Mr. LYONS. For us to navigate, we are a large active manager, we do fundamental analysis, our order sizes are quite large relative to the available market share. For instance, in the U.S. our average order is about 65 percent to 75 percent of the average daily volume.

So for us to be able to maximize the returns that our investors receive from that decision to invest in that position, we need to implement that in a way that minimizes information leakage, certainly, because as word gets out that a large institution is investing in the marketplace the price starts to move.

People start to freeride against that information. So it is our concern to make sure that that information leakage is minimized.

Mr. POLIQUIN. As a result, sir, might you break apart a large institutional order into smaller pieces and execute the trade that way? How could that help your clients?

Mr. LYONS. Yes, we do. The basic strategy we take depends on the investment thesis, certainly. But in general, to minimize market impact, we will look to passively interact with the marketplace so that we can effectively avail ourselves to the liquidity that is available at that time.

In the same period, we look for large block liquidities, too, other large participants in the market that we can negotiate a large block on behalf, because that is typically the best outcome for us.

Mr. POLIQUIN. Is this split—

Mr. LYONS. Yes, but splitting the market and splitting the order into—doling it out into the marketplace, we use advanced tech-

nologies to do that. We are connected to multiple liquidity pools, and we use that technology and the expertise of our traders to be able to do that effectively.

Mr. POLIQUIN. Is this challenge that you have, to make sure you get best price at the lowest cost, a function of your size or is there anything that you would recommend to this panel, to Congress, to the SEC, that would be an adjustment to the equity market structure that would help facilitate that such that our folks in Maine receive the benefit of the best performance they can for the return?

Mr. LYONS. Yes, thank you. I specifically think that looking at reducing conflicts of interest, specifically around the maker-taker pricing scheme—

Mr. POLIQUIN. Give us an example of that.

Mr. LYONS. For instance, we are talking about why people interact at different markets and why maybe the exchanges have inferior execution. As broker-dealers implement investment decisions that I may have, part of what they try to do is control the economics around it, control their cost of executing that on my behalf. That maximizes their profit.

In doing so, they try to utilize non-exchanges, non-displayed liquidity to sort of minimize those costs associated with the exchange. This really effectively diminishes the amount of order that interact in a lit market and really can have a detrimental impact on the price formation mechanism.

So really, we look to see if there are ways to increase order flow into the lit market so that we can have robust price discovery mechanisms. I think that that is sort of the focus. It was really what we think can happen with all the suggestions we have made over the written testimony and oral testimony.

Mr. POLIQUIN. Thank you very much, sir. I yield back my time.

Mr. SALUZZI. Congressman, could I get one of those brochures? We are planning a vacation.

Chairman HUIZENGA. Now, the chair will remind you the Pure Michigan campaign is in full swing as well, so—

Mrs. WAGNER. Go Cardinals.

Chairman HUIZENGA. Anybody else care to risk being gaveled down? OK.

With that, the chair would like to recognize Mr. Budd from North Carolina for 5 minutes.

Mr. BUDD. Thank you, Mr. Chairman. At the risk of the gavel, the mountains of North Carolina are great this time of year.

Mr. Lyons, so it is a general theme we talk about. Most of the testimony that the markets of the United States that we are very efficient, well capitalized and high functioning compared to any in the world.

And we talk about the results but the results being lit transparency, liquidity, trust, confidence, efficiency and fairness are just some of the things that I have heard mentioned. But what are some of the features that have led to that, that make us unique versus other international equity markets?

How do we ensure that we preserve those as we look at these equity markets and as we move forward? How do we make sure that we preserve those things that have led us to that position?

Mr. LYONS. Well, that is a big question—

Mr. BUDD. Sure.

Mr. LYONS —and probably one that I am not adequately prepared to know all the answers, that is for sure.

But I do think that any ways that we can impede frictions in the marketplace to allow natural buyers and sellers to interact with each other to try to limit the amount of unnecessary intermediation that exists in the marketplace, I think, will benefit our markets.

I think it will lead to more trust. I think it will allow investors to take advantage of the investment managers they entrust their savings to. So I really think that focusing on the issues that we have talked about will lead to that.

I would say as an aside in speaking about the one-size-fits-all that Joe talked about, certainly, there is a need for market makers to be in the market providing liquidity. And the maker-taker pricing scheme probably helps that. But really, market makers should survive on the spread.

And so if there are inefficiencies in the market between a small-cap stock or a large-cap stock, that should be embedded in the spread that market makers are willing to participate in, and I think that that would be more beneficial than having to entice them to be there to create artificial spreads.

Mr. BUDD. Mr. Brown, did you care to weigh in on that?

The microphone?

Mr. BROWN. Around the globe—one of things that I have mentioned is that the United States has the highest percentage of retail investors in the world. To me, that is a critical element, having people trust our markets so that they can—as the other panelists have mentioned that this is their retirement savings.

Trading is not a game. It is a tool for people to save their money, to save up for retirement or save up for a house, whatever it is.

So I think we have to remain focused that as individual investors seek higher returns in this low volatility environment there are risks that they may want to take. A firm like ours, we want to be able to work with our clients, offer them information so they can make better judgments about what it is they ought to do with their money.

So I would not want us to take steps that would disincent individual investors from being in our marketplace.

Mr. BUDD. Sure. Thank you.

Mr. Rubenstein, again, thank you for coming—each of you. You mentioned earlier that you have been on the trading floor for a long time, 20 years ago, and I happened to see the modern version of it just last week being on the floor and seeing your company at work.

But we talk a lot about how this may have hurt the retail investor or even the institutional investor, some of this technology. But what in the past were some practices that were going on that had stopped as a result of technology that have put us in a better position today?

Mr. RUBENSTEIN. Thank you, Congressman. Well, just like it is so easy to shop online using technology and get around using different apps on our phone that can quickly tell you what the traffic patterns are, technology and computing power is just going to really increase efficiency and accuracy.

So on the floor of the exchange as a market maker, we would have to—using our eyes and you had to just assess what the best price was, looking at what is happening in the options market, for example, or watching what was happening on the commodity in the commodities pits on the floor.

But now, because of computers, so much more information can be analyzed. Other firms can compete using that same information. And what that means is you have got all these market makers competing with very sophisticated technology and what happens is the investors got a very tight spread and saves money every time they trade.

Mr. BUDD. Thank you. Just in the remaining few seconds, do you see on the horizon—any of you—blockchain technology as a disruptive force in equity trading? I don't know if that is even on your radar in the future for settlements. Not at this time? All right.

Thank you. I yield back.

Chairman HUIZENGA. The gentleman yields back. With that, the gentleman from New Jersey, Mr. MacArthur, is recognized for 5 minutes.

Mr. MACARTHUR. Thank you, Mr. Chairman. It is an interesting time, I think, to revisit Reg NMS and see how it has functioned over the last decade and where we might need to make changes.

When I think about how that came about and I think about the regulatory regime in the 1970s that sort of gave rise to all of this national market system, it seems to me there are a couple of areas that were intended to—and they still are intended to define the market: efficiency, fairness, availability of information, access for people, however they want to access the market, optimal execution.

I want to focus on the fairness issue for a moment. Mr. Brown, both you and Mr. Lyons have touched on this a little bit, how different market participants interact with one another and whether things have become unbalanced.

And I could take this in a number of different directions. The maker-taker fee system has come up a few times. It reminds me of—I came up in the insurance industry, and we had issues back in the 1990s where brokers were driving business in ways that seemed to have more to do with their own profitability than their client's needs.

It creates a lot of unsettledness among participants. And I think that may happen in this area as well. But my question is back to the SROs.

Mr. Brown, I will start with you. You specifically mentioned earlier that you are concerned that there are conflicts of interest and that as the SROs have become for-profit enterprises and have expanded their business, done all the things that they should do as for-profit businesses, they are now in competition with other market participants. And that conflict has remained unchecked thus far.

So I would like you to unpack that a little bit. What are some of the areas of conflict? What should happen to alleviate that? Who should act here? Should it be Congress? Should it be the marketthe whole industry? How do we fix some of these areas so there is not this doubt in the marketplace about why companies do what they do?

Mr. BROWN. You are absolutely right, sir, that exchanges as for-profit corporations have a duty to make money for their shareholders. That is their fiduciary duty, and they need to do that. But they operate under this mantle of self-regulatory regulatory organization.

And that is a government-granted status that says they have the right to regulate their participants, the people who use their system. Yet when they compete with those members for routing of orders or other things, they then are both regulator and competitor.

And that is a conflict that is very difficult to mitigate.

Mr. MACARTHUR. So who should fix that?

Mr. BROWN. Well, I would urge Congress to look into this issue, and to say is it still a part of our national market system, a fundamental ingredient that we have self-regulatory organizations that are actual businesses?

We have a self-regulator, FINRA. FINRA is a true regulator. They could absorb the regulatory function and Congress could delegate to them to absorb the regulatory function, and turn exchanges free from being SROs. They could be, yes, and to be commercial enterprises as they are.

Mr. MACARTHUR. Do any of you see value in the exchanges being SROs? And not as has been proposed using someone else like FINRA to do that?

Mr. SALUZZI. Congressman, if I may, I think exchanges enjoy a number of benefits from being an SRO, one of them being immunity as well. They do have some sort of immunity when it comes to regulatory issues.

If there is a trade error or, as is in the Facebook case, the Facebook IPO, there was a problem, and that is a nice benefit to have, yet they still are in the for-profit business.

So I think to square those two up is a bit of a challenge and maybe that does need to be separated there.

Mr. MACARTHUR. OK.

Mr. LYONS. I would only add that there certainly is an important function that SROs perform and exchanges perform in terms of monitoring and surveilling what is going on in the market to detect manipulative or bad practices. So I think they serve a role working in that capacity.

To answer your question about what should be done, I really think the SEC needs to take a leading role in this and advocate for additional participants, non-SROs, to be part of the NMS governance package.

Mr. MACARTHUR. I am sorry, my time is up. Perhaps you could respond in writing afterwards, if you would, or somebody else may have the same question.

I will leave you with this. New Jersey and you, perfect together.

And a lot closer than Maine. Thank you.

Chairman HUIZENGA. I am definitely gaveling this closed now. OK. Well, we are going to be moving into our next panel here shortly. I am going to be recessing for 2 minutes, and I mean 2 minutes. But I do want to thank our distinguished panel for your time and your effort in being here today.

It is deeply appreciated. I know that these conversations will continue, and again, I just want to say thank you for your expertise

and your insight. So with that, the committee is recessed for 2 minutes.

[Recess.]

Chairman HUIZENGA. The committee will reconvene, and I would like to say thank you to our second panel for your patience in being here but we also think that might have been valuable to have heard from some of the participants. I think that was a goal and objective of mine was to get some of those views out of folks who had been using the system and using the markets and are engaged in that on a daily basis.

And we now have the privilege of hearing directly from those of you representing the markets. Real quickly, again, we will run over our panel.

The second panel here is Tom Farley, President of the New York Stock Exchange. We have got Brad Katsuyama, CEO of Investors Exchange, IEX; Chris Concannon, who is President and Chief Operating Officer of the Chicago Board of Options and Exchange; John Comerford, Head of Global Trading Research at Instinet; and Tom Wittman, Executive Vice President and Global Head of Equities for NASDAQ.

I really appreciate each of you being here today, and I think we are going to dispense with the opening statements from us on this panel and move right into the opening statements from all of you.

So with that, Mr. Farley, you are recognized for 5 minutes.

STATEMENT OF THOMAS FARLEY

Mr. FARLEY. Good morning. Thank you so much, Chairman Huizenga, Ranking Member Maloney, all the members of the subcommittee. As the chairman said, I am Tom. I am the President of the New York Stock Exchange.

I have submitted written testimony so I wasn't going to just read verbatim the testimony and rather I was going to provide a few thoughts on the history of markets and how it relates to the subject matter today.

Chairman HUIZENGA. That would be fine, and I should remind the panel that each of you have put in a written testimony, which will be submitted for the record.

So with that?

Mr. FARLEY. We celebrated a big birthday last month, the 225th birthday of the New York Stock Exchange. If you go back to the origin, the stock exchange was founded right at the corner of Wall Street and Broad Street in New York. And that was actually where the country was born, essentially.

George Washington was sworn in there. The first Congress of the United States was right at Wall and Broad. The Bill of Rights was ratified, so on and so forth. And in those days, entrepreneurs, Alexander Hamilton was one of the first actually, he founded Bank of New York, they would show up on the corner and they would pitch their ideas and there were prospective investors there.

And the prospective investors would hear is this a good idea, is this not a good idea and they would allocate capital judiciously. In order to entice that capital allocation they started trading the securities day after day because the investors wanted to know if I give

you money, Alexander, and I change my mind in the future, how do I know I can get it back?

So the act of raising that capital is really the primary function of an exchange and that everyday trading is the secondary function of an exchange. That is what we think of as the stock market.

If you fast forward 225 years, that is exactly what we do today. Our mission has not changed. It has not wavered. We help great men and women raise capital to go turn their dreams into reality and go make life better for Americans and global citizens.

And as a necessary byproduct of that, we also operate very efficient secondary markets for trading of those securities. And that is kind of how it works.

Even in those earliest days, traders would show up at the corner of Wall and Broad and they would say publicly this is where I am willing to buy this particular stock. This is where I am willing to sell this particular stock. And that was displayed liquidity, and that was the lifeblood of this secondary market. And again, nothing has changed.

The New York Stock Exchange, just by way of background, has flourished during that time, I can say with all due humility, because I had nothing to do with the first two centuries, as you might imagine. But we are the largest exchange in the world, $30 trillion in market cap, round about 40 percent of all market cap in the world is listed with us.

So I come into this meeting with very much a bias and perspective of the listed companies. And from the listed companies' perspective something is wrong. If you look, the number of companies is down by almost half over the last 20 years.

IPOs have declined dramatically. The 10-year period starting in 1991—the lowest numbers of IPOs in a given year in the U.S. was 350. In the current 10-year period that we are in, the highest number of IPOs is 290. So you are seeing fewer and fewer companies going public, which is not a good thing for society.

That is fewer investment choices, fewer companies that the retail public can take advantage of value creation.

And so the question is why? Well, the market is actually working pretty well for big companies because the aggregate market cap is growing. So the number of companies is shrinking but aggregate market cap is growing, which means the average company is much bigger.

The Bank of Americas, the JPMorgans, in your district, Congresswoman Maloney, they can afford to deal with the challenges of being public. But the small to mid-sized businesses can't. They are swamped. The pendulum has swung too far. In fact, the pendulum is kind of beating them about the head.

They are having to deal with the litigation environment in this country. They are having to deal with regulatory creep, and I think the ever-expanding scope of Sarbanes-Oxley is a good example of that. They are having to deal with new regulations that have come about largely from Dodd-Frank that reflect a social agenda untethered from whether the disclosures required are actually material to investors.

I mean, this is a very difficult environment. One thing that really drives our listed companies a little bit bonkers is dealing with

these proxy advisory firms, which are so powerful and opaque and have a lot of importance, but not accountability.

So we think we need to focus first on that primary part of the market. I know today is mostly about the secondary function and trading of securities, but I felt like I had to make that important point because that is driving so much of what concerns us in the stock markets today.

Just briefly on the secondary point, on the secondary market, in other words, on the stock market, we will talk a lot about it. I look forward to the Q&A. I will come at it from a perspective, again, of the listed company. They look at the markets and they say, wow, this has gotten very fragmented.

For the small and mid-sized companies our spreads have widened. For the big companies, again, it is working. It is working well. But small to mid-sized companies there is a real problem and the listed companies are asking us, and in turn I am asking you and our regulators focus on simplicity, focus on transparency. That is what the listed companies are looking for. Thank you.

[The prepared statement of Mr. Farley can be found on page 91 of the Appendix.]

Chairman HUIZENGA. Thank you, appreciate that.

Mr. Katsuyama, 5 minutes.

STATEMENT OF BRAD KATSUYAMA

Mr. KATSUYAMA. Thank you. Chairman Huizenga, Ranking Member Maloney, and members of the subcommittee, thanks for the opportunity to offer this testimony. I appreciate your willingness to provide a forum to consider ways to strengthen the U.S. equity markets.

My name is Brad Katsuyama. I am the co-founder and CEO of IEX Group. We are the newest national stock exchange, and as an exchange we continue to innovate and prioritize the interests of investors. And pending regulatory approval from the SEC, we will compete for corporate listings later this year.

The U.S. equity markets are a critical national asset. Capital formation is key to economic growth, and today we must ask do the markets serve the interests of investors, companies, and capital formation, or do they serve themselves?

All market structure changes should be evaluated through this lens, and if the equity markets are not evolving in a way that best serves these constituents, actions should be taken.

When we say the word investor, many people instinctively think of mom and pop with a retail brokerage; however, mutual funds, pension funds, and institutions manage 63 percent of U.S. equity holdings, which reflects the savings and retirements of everyday Americans.

This distinction is important because today's market has been optimized for trading in small size with little consideration for the needs of large institutional investors.

Many of the public companies we have met with over the past couple of years are frustrated with the opacity and complexity of the current markets as they realize the exchanges they rely on for market support have significant conflicts of interest and their confidence and trust in the market is undermined.

Technology drove the majority of improvements in the equity markets over the past two decades. Efficiencies such as increased automation, lower costs and faster speed, but if you consider the advances in technology brought to the public in other industries in the equity markets, exchanges and certain traders have largely hoarded these technology benefits at the expense of investors.

The proper role of an exchange is to act as a neutral referee, providing the most accurate price to both sides of the trade. And unfortunately, exchanges fail in this role by selling a faster view of market data to high-speed traders than the exchange itself relies on to price trades on its own market.

In essence, they have sold high-speed firms the ability to trade while the referee looks the other way.

A critical turning point for U.S. equity markets occurred when the national stock exchanges made the conscious decision to sell high-speed data and technology instead of allowing third-party vendors to compete at selling these products in the open market.

This decision by exchanges conflict with their role as self-regulatory organizations responsible for maintaining fair and orderly markets. Exchanges purposely selling multiple versions of the same stock market based on tiers of access, data and technology benefit only the fastest high-speed traders at the expense of all others, which is anything but fair or orderly.

Exchanges deciding to sell data and technology also enabled monopoly power. Clearly there is no substitute for New York Stock Exchange market data being sold by NYSE inside of the NYSE datacenter. No other entity can provide this level of access and all of the major exchanges abuse this monopoly.

A broker recently cited their NYSE market data costs to receive market data increased by 700 percent since 2008, a shocking figure when you consider rapidly declining technology costs in other industries. IEX can say from our own experience that what exchanges charge for data and access bears no rational relationship to what it costs to produce it.

The greatest irony is that investors and brokers create market data when they send orders and trade. The exchanges aggregates this information and sells it back to the industry.

So exchanges just effectively deliver the news. They don't make the news. They don't write the stories, but the governance committee that oversees market data is operated by the exchanges with no broker or investor representation, and this should change.

Finally, the most harmful but easily addressed conflict is the practice of exchanges paying $2.5 billion a year in rebates to brokers to send them orders. Exchanges reap profits by selling those orders back to the industry in the form of market data, and this practice also creates a conflict of interest as brokers keep the vast majority of rebates that exchanges pay them, even when routing client orders.

In fact, two former SEC chief economists stated that, "In other context, these payments would be recognized as illegal kickbacks." Publicly available data showed that exchanges who pay the highest rebates per share for providing liquidity, provide on average worse execution quality.

But despite these downsides, the large rebate exchanges have the largest market share and the longest lines to trade, which is alarming. Would a reasonable person ever wait on the longest line for a worse outcome?

The answer is no, but in the equity markets that is happening millions of times a day, every day, as brokers are paid to get in the longest line despite what is in the best interests of their clients.

We face a unique bipartisan opportunity to deregulate the stock market for the benefit of investors and companies. Many of the complex regulations in place today were originally designed to protect investors but over time they resemble Band-aid solutions to manage a market plagued by conflicts of interest.

Parts of Reg NMS can be relaxed or removed if rebates were eliminated. Brokers would be free to focus on providing clients with the best execution quality. Exchanges would compete without the conflict of paying $2.5 billion per year in rebates.

As a result, market data, technology costs would decrease to competitive levels, delivering value back to brokers, traders, and investors without the need for further government price controls. All of this is possible by eliminating rebates and aligning the interests of the exchanges, brokers, investors, and companies.

We have the largest most important stock market in the world, a pillar of American capitalism but nothing about a healthy market and competitive market should require artificial incentives for people to trade.

I look forward to the opportunity to discussing this further. Thank you.

[The prepared statement of Mr. Katsuyama can be found on page 97 of the Appendix.]

Chairman HUIZENGA. The gentleman's time has expired.

With that, Mr. Concannon, you have 5 minutes.

STATEMENT OF CHRIS CONCANNON

Mr. CONCANNON. Mr. Chairman and members of the subcommittee, I am Chris Concannon, President and Chief Operating Officer of the CBOE Holdings. I would like to thank the subcommittee for inviting me to testify today. I also commend this subcommittee for its ongoing review of complex critical issues that exist within the U.S. equity markets, including issues like Regulation NMS.

CBOE is one of the world's largest exchange holding companies. We offer the industry's widest array of products, including options, futures, equities, ETFs, FX, and proprietary index products, such as S&P 500 options and futures and options on the CBOE volatility index, or VIX.

In 1975, Congress amended the Securities and Exchange Act of 1934 to facilitate the establishment of a national market system to link together the multiple exchanges. Congress intended for the Securities and Exchange Commission to take advantage of the opportunities created by advancements in technology to preserve and strengthen the securities markets.

In response to this congressional mandate, the SEC has adopted various rules since 1975 to further the objectives of the national market system, including Regulation NMS in 2005.

The implementation of Regulation NMS has contributed positive results to our markets. Market quality and reliability continue to improve, and retail customers now have low cost immediate access to our markets with exceptional execution quality.

However, Regulation NMS has also contributed to some unintended consequences throughout the marketplace. While order protection is beneficial to displayed limit orders, the existence of order protection provides new or relatively small exchanges with a commercial advantage, despite not having to demonstrate their value to the marketplace.

Any competitive benefit that may result from an additional exchange can be offset by the increased costs and complexity relating to the required connectivity to an additional market. The U.S. equity market currently supports 12 equity exchanges and over 40 SEC-registered dark pools. I assure you that was not what Congress anticipated in 1975.

Now, complexity and fragmentation is not itself a problem. Our market quality for retail orders clearly reflects that we have professionally solved for these two challenges. However, certain orders and certain market participants experience serious challenges as a result of this fragmentation and complexity.

The handling of large orders for institutional customers has clearly suffered over the last 10 years. While spreads have narrowed, there is less displayed liquidity to satisfy large orders. The current market experiences a greater market impact as these large orders enter the market. And as a result, those large orders take longer to get executed and may experience reduced execution quality.

This large order size problem affects our Nation's largest asset managers, including pension funds and mutual funds.

These challenges that large orders experience are not in every symbol across the U.S. equity market. Those challenges are typically not experienced in more liquid stocks, which include large-cap names and ETFs.

In this regard, I believe Reg NMS was critically flawed in its one-size-fits-all approach to our markets. Under Regulation NMS, all stocks are treated similarly regardless of market cap liquidity or public float.

Our current market rules do not care if a stock trades once a month or 1 million times per day. Our market rules do not care if a company is valued at $800 billion or $25 million. This is not an ideal design for the largest, most diverse equity market on the planet.

Given these flaws and the challenges that Reg NMS has crated in our equity market, I encourage the subcommittee and the SEC to undertake a comprehensive review of Regulation NMS to address some of these unintended consequences given the significant changes to our marketplace since its implementation in 2007.

As part of a comprehensive review of Regulation NMS, we urge the subcommittee and the SEC to consider the appropriateness of the one-size-fits-all approach of the regulation.

We also believe that other aspects of Regulation NMS warrant reconsideration. We believe the outdated access fee cap and the prohibition on locked and cross markets are both worth revisiting.

We also suggest consideration of a market structure that would only protect quotes displayed by exchanges that meet a minimum market share threshold, which is an approach used in the Canadian markets.

I also recommend this subcommittee urge the Commission to study the recent phenomenon of what I call ultra-high priced stocks and their impact on investors and market structure.

Currently over 13 percent of the overall market capitalization of the U.S. equity market is comprised of securities that trade above $200, including well-known names like Amazon and Alphabet, each currently trading over $1,000 per share.

While our current equity market structure has its flaws, I believe the U.S. equity market continues to be the most efficient and liquid markets in the world. I encourage any proposed reforms to carefully consider the impact of all market participants and the potential unintended consequences of the market.

Thank you for the opportunity to appear before you today, and I am happy to answer any questions you may have.

[The prepared statement of Mr. Concannon can be found on page 84 of the Appendix.]

Chairman HUIZENGA. Thank you very much.

With that, Mr. Comerford, you have 5 minutes.

STATEMENT OF JOHN COMERFORD

Mr. COMERFORD. Chairman Huizenga, Ranking Member Maloney, members of the subcommittee, Instinet appreciates the invitation to participate in this important hearing. We believe that Instinet, an agency broker founded in 1969, can bring a unique perspective to this process.

For nearly 50 years, Instinet has provided institutional investors with electronic agency trading services and technologies, services including the first electronic trading platform, the first U.S. crossing network in 1986 and some of the markets' earliest examples of direct market access, smart order routing and algorithmic trading strategies.

Instinet has also been a leader in offering robust transparency to its clients with some of the first transactions, cost reporting and analysis tools in the industry. At its core, Instinet has been guided for nearly half a century by one primary goal: providing best execution to its customers.

Looking back at 10 years of Regulation NMS, I believe we can definitely say that it has been successful in its goals of enhancing the efficiency of the market and supporting fair and vigorous competition.

However, in order to retain our markets' competitive advantage we need to review whether our regulations, one, continue to provide a level playing field for vigorous competition, enhance confidence both for retail and institutional customers and continue to support innovation.

As others on this panel will likely cover the regulatory path to NMS and share their insights into Rules 605, 606, 610 and 611, I thought that I would discuss a less obvious but no less critical component to Regulation NMS, namely Rule 612, the Sub-Penny Rule.

A little bit of history, the tick size on the primary U.S. exchanges began its decline in 1997, dropping from the longstanding one-eighth of a dollar—that is 12 and a half cents—to "teenies" or one-sixteenth of a dollar. This change was driven in many ways by competition from the ECNs at the time.

In 2001, U.S. equity markets fully decimalized. It is worthy to note that it was decimalization more than Regulation NMS that drove average spreads down toward the levels that we currently experience.

Rule 612 set the floor on this tick size compression, setting the minimum pricing increment of quotes and orders to one penny for all stocks trading over a dollar. At the time, a penny seemed reasonable, however, we now know that tick sizes can be both too large and too small.

We better understand that our one-size-fits-all tick size can contribute to some of the unnecessarily complex and disorderly trading that we have been discussing on these panels.

Markets are more efficient and orderly when costs and incentives are balanced for disparate market participants. As Mr. Lyons said in the previous panel, the tick size or spread is the primary incentive for liquidity providers to display the liquidity. And it is also the primary cost liquidity takers pay for immediacy of execution.

For lower priced and higher volume names, a penny tick size can be too large. And when tick sizes are too large, competition at the NBBO becomes extremely fierce and volume is pushed toward dark pools and toward inverted exchanges. In general, the market gets extremely complex and there is a premium placed on speed and the use of advanced order types.

On the other hand, for higher priced and lower liquidity stocks, even some of the stocks that Mr. Concannon just discussed just now, large stocks, small percentage tick sizes, think a penny on $1,000 is very little, reduce the incentive to post liquidity. Spreads increase and liquidity becomes hidden and more disorderly.

Rule 612 was designed specifically to combat this activity specifically, and I quote, "To promote greater price transparency and consistency, as well as to protect displayed limit orders and address the practice of stepping ahead of displayed limit orders by trivial amounts."

In conclusion, I would like to note that while I focused on one specific rule in Reg NMS, market structures issues are complex and inter-related. The tick size and the access fee in particular are completely related. Therefore, any material changes to market structure inputs are best considered holistically and comprehensively rather than independently.

We at Instinet thank you for the opportunity to share our thoughts and opinions. I look forward to answering any questions you may have.

[The prepared statement of Mr. Comerford can be found on page 78 of the Appendix.]

Chairman HUIZENGA. Thank you. I appreciate that.

Mr. Wittman, you are recognized for 5 minutes.

STATEMENT OF TOM WITTMAN

Mr. WITTMAN. With time to spare. Thank you, Chairman Huizenga and Ranking Member Maloney for the opportunity to testify today. I applaud your hard work to bolster our public markets. Let me begin with a few observations about the U.S. marketplace.

Our markets are the strongest and fairest capital markets around the globe. They are the envy of the world. U.S. equities are unmatched in liquidity, depth, and transparency. Only data-driven analysis should underpin potential changes.

Reg NMS is not perfect, but it has achieved its intended target of enhanced competition among exchanges, improved resiliency and lowered the overall cost of trading.

Self-regulation remains critical to investors in the U.S. equities market. Investors must have confidence that the markets are fair and well-regulated.

Without SROs, the SEC would face serious challenges to protect investors and ensure a fair and transparent market that is available to all. Without SROs, the SEC would have to grow significantly.

The SEC's Equity Market Structure Advisory Committee membership lacks key viewpoints and its recommendations do not address broader and deeper issues, such as a lack of capital formation. Capital formation is a central issue facing the markets today.

The focus of all market structure discussions should be how do we improve the liquidity and trading experience for small public companies?

The trading environment fails to take in account the size and the needs of smaller public companies. Market structure has real and, at times, unintended impact. The smallest companies have had their trading spread across 50 venues. The fragmentation I believe hurts the trading in those securities.

Market structure has evolved to better serve investors without regulatory or legislative action. For example, the last time NASDAQ testified before this subcommittee, the speed and resilience of market data was discussed often, and was again in the panel before us.

Since then, NASDAQ has enhanced the NASDAQ securities information process for the SIP with state-of-the-art technologies that simultaneously strengthen resiliency and reduced processing time by over 90 percent, a technological advancement that NASDAQ is especially proud of to deliver to the markets.

The duty to provide fair and equal access should be harmonized across all platforms to protect investors from unfair discrimination, avoid two-tiered markets, and unify liquidity that is fragmented over 50 execution venues.

Regulators must consider the structural advantages of off-exchange trading when considering new layers of regulation that could push additional trading off exchange.

NASDAQ's perspective on market structure is unique. We operate closer to the intersection of capital formation and market structure than many market participants.

Our revitalized recommendations center on many items this committee has already considered as part of the Financial Choice Act.

You could find this in the full testimony that we presented in written format.

The key regulations that form the foundation of today's markets, including Reg NMS and Reg ATS, were developed and implemented more than a decade ago.

Today's liquidity dilemma stems from long-term trends toward fragmentation where liquidity is spread across too many trading venues, nearly half of the U.S. publicly traded companies, small and medium growth, trade more than 50 percent of their volume off U.S. exchanges. This hurts price formation.

NASDAQ believes permitting issuers to choose to trade in an environment that concentrates liquidity for small and medium growth companies into a single exchange will allow investors to better source liquidity.

The introduction of unlisted trading privileges gave rise to fragmentation, combined with a proliferation of ATSes. When it comes to UTP, the law of diminution of margin returns applies and we have far exceeded the point of which the benefit outweighs the cost.

Every company listed in the U.S. markets trades with the same standard tick sizes but advancement in technology make this unnecessary. NASDAQ's experience and research demonstrates that one-size-fits-all for tick sizes is not appropriate, particularly in small and medium growth companies.

NASDAQ believes that these companies should have the ability to trade on sub-penny, penny, nickel or even dime increments. Both NASDAQ and the NYSE petitioned the SEC for this reform many years ago, with nothing to show.

We believe that implementation of an intelligent rebate fee structure that promotes liquidity and avoids market distortions. NASDAQ relies on liquidity rebates to motivate market makers to enter aggressive quotations in which return ensures that price discovery is accurate and reliable.

This is critically important for illiquid securities. NASDAQ believes that a study for rebate levels must be well-designed to help develop an intelligent fee rebate regime. We firmly believe that a blunt access fee pilot does not consider the impact of liquidity and could harm smaller company stocks.

Establish regulatory harmony to protect more investors. Investor orders should be equally protected wherever executed. The Commission must explain whether 60 percent of orders that are executed on exchange merit a higher level of protection than the 40 percent of the orders executed off exchange.

In times of stress or crisis, the Commission naturally turns to exchanges to add safety nets like Reg SCI, Reg SHO, limit up-limit down was a burden for exchanges to solve. One size does not fit all.

Well-functioning markets require a mix of market participants, issuers, and investors. The system must accommodate passive investing, high-frequency trading and business models in between and perhaps, most importantly, the markets must work efficiently for all issuers, from 50 million in notional value to 750 billion.

I look forward to the questions that this committee has for me. Thank you.

[The prepared statement of Mr. Wittman can be found on page 150 of the Appendix.]

Chairman HUIZENGA. Thank you all for your testimony.

We are going to try to move fast before we have votes—I have not seen a real recent, but the last I had seen somewhere between 1:15 and 1:30.

I would like to start. I think primarily when Mr. Farley and Mr. Wittman and Mr. Concannon and all of you heard me ask Mr. Lyons and Mr. Brown from the previous panel about allowing broker-dealers and asset managers to have direct voting representation on NMS plan operating committees.

I understand both NASDAQ and NYSE are opposed to that. Mr. Concannon, at CBOE, your exchange has not opposed necessarily giving broker-dealers, and I believe Mr. Katsuyama as well, but in view of a bit of a different animal at IEX.

So I want to know if you would please address that and then also I want to give you a little time. Would you also like to address some of the points that were raised in the first panel with regard to SIP versus market data and any of those other issues?

So Mr. Wittman, why don't we start with you?

Mr. WITTMAN. OK. Yes, I was actually—when you look at the governance structure there, there are advisors from broker-dealers that sit on that committee and have a voice in the conversation that takes place. It is correct they don't have a voting right, but there is more transparency on those committees as they are structured today.

As we looked at the SIP re-platform that NASDAQ did, it has reduced latency extensively and we did a re-platform of that SIP. So we think they have adequate visibility and transparency into what takes place at those meetings right now.

Chairman HUIZENGA. Mr. Concannon?

Mr. CONCANNON. In the past—

Chairman HUIZENGA. Before I actually get you, Mr. Wittman, is there anything else that you wanted to address from that first panel that you wanted to touch on?

Mr. WITTMAN. No, that is it.

Chairman HUIZENGA. OK. All right.

Mr. Concannon?

Mr. CONCANNON. I agree with Tom that the plan, the SIP plan and the governance has improved fairly dramatically over the last couple of years with respect to transparency and the advisory level participation.

In the past, we had been supportive of introducing both buy-side and sell-side participants into the full committee of the SRO plan. We are willing to consider that kind of participation. I do think the SIP serves a valuable need for our markets and in fact, clients do see the SIP when they are going to execute a quote.

If you look at some of the comments, I will address some of the comments from the prior panel with regard to market data, there is heated competition in market data around proprietary market data. We compete with both the New York Stock Exchange and NASDAQ for our proprietary market data, and we have seen adjustments in price for the benefit of the end user as a result of that competition.

So I assure you there is thriving competition in the world of proprietary market data. I do think, and I agree with the prior panel,

that there is probably more room for adjustment around the plan and the SIP plan itself.

Chairman HUIZENGA. Mr. Farley?

Mr. FARLEY. Yes, we are very strong proponents for more inclusion in policymaking around the plans. In fact, the New York Stock Exchange has really been pushing to strengthen the advisory committees that we have that have broad representation from throughout the industry.

But one other point I wanted to make about the plans that I think is important is—and the SEC can make rules or the SEC can delegate to the NMS group that they go away and they make rules. And over the recent past, the SEC has been using that second approach far more often.

And that engenders a good deal of ill-will. Quite frankly, the exchanges are perceived to then be in charge of policymaking. In reality what goes on is the SEC is directing that policymaking. And so—

Chairman HUIZENGA. So you don't think that has been a positive?

Mr. FARLEY. Right. I do not think it has been a positive. I think when the SEC goes through and does the work and goes through the appropriate legwork, the appropriate appropriations process, the appropriate cost-benefit analysis, public comment, you get a better rule that has more buy-in from the industry than if you go through this NMS rulemaking.

Chairman HUIZENGA. Why has the SEC done that?

Mr. FARLEY. You have have to ask the SEC. I don't want to speak on their behalf.

Chairman HUIZENGA. Mr. Concannon?

Mr. CONCANNON. In all honesty, it is quicker. It is a process that allows the exchanges to take on the burden of writing the rules, presenting them to the SEC for their approval. This did work in response to the Flash Crash with the exchanges getting together quickly and writing rules around limit up-limit down protections.

So there are times when it works and when it is appropriate. But there has been a heavy use of pushing the burden of rule writing to the exchanges and the plans themselves.

Chairman HUIZENGA. Do you agree that that has damaged those relationships?

Mr. CONCANNON. Yes, absolutely. The Tick Pilot is a perfect example of where we really didn't agree on all points of the Tick Pilot, but we were mandated to deliver a set of rules that left the industry quite frustrated.

Chairman HUIZENGA. OK. My time has expired. I would have loved to explored the IPO situation and I applaud Chairman Clayton expressing his concern as well. I think that is something we are going to need to address.

So with that, I recognize the ranking member for 5 minutes.

Mrs. MALONEY. OK. Thank you, Mr. Chairman.

And thank you to all of the panelists, a truly outstanding panel. I particularly would like to welcome Thomas Farley and Thomas Wittman from the New York Stock Exchange and NASDAQ, two extraordinary companies in the great city of New York, and really all of the panelists for being here.

I would like to ask Mr. Wittman and Farley, the SEC's Equity Market Structure Advisory Committee has recommended that the SEC do a pilot program to test whether market quality improves with lower rebates.

Do you think they should go ahead with this pilot program and if so, who should design it, the SEC or should they go with the committee of exchanges, like they did with the Tick Size Pilot Program?

Mr. FARLEY. I will go ahead first.

Mrs. MALONEY. OK.

Mr. FARLEY. Thank you for the nice greeting, and thank you for your service on behalf of the people of New York.

Mrs. MALONEY. Thank you.

Mr. FARLEY. Great question, and it goes back to my comments from just prior about NMS rulemaking and asking the exchanges to make it versus the exchanges going through the effort themselves. We feel strongly that the SEC, if they so chose to engage in a rulemaking, should do so through the appropriate rulemaking process, as opposed to delegating that to the exchanges.

Secondarily, just with respect to this Equity Market Structure Advisory Committee, we are not on that, nor is Tom. They got the composition wrong. We have been told that privately and even to some extent publicly.

It does not include our input, therefore it doesn't take into account the listed company view, which quite frankly I would argue is the single-most important view there is.

And so they didn't get it right with respect to this particular recommendation, and there is a lot of work to do.

Mrs. MALONEY. OK, thank you.

Mr. WITTMAN. I would say when you take a look at access fees, I think they are looking at the wrong way to look at the cap and access fee. And as an exchange that looks to list companies, we have got 3,300 companies that we list, we are focusing on the small and mid-sized companies.

I think you need to take the conversation more toward the rebate, how do we liquefy the small and mid-sized companies? And it could take varying different levels of a rebate in order to bring those companies to the public markets.

So we are focused there on intelligent rebates, intelligent tick sizes and not so much on the access fee cap. And I think it is more small and mid-sized companies that we are focused on here.

Mrs. MALONEY. Thank you.

Mr. Katsuyama, you said in your testimony that the prices that exchanges charge for market data bears no relationship to the cost of producing that data. And what are the costs for an exchange of producing market data? And second, how much lower would market data fees be if exchanges only charged the cost of producing that data?

Mr. KATSUYAMA. So market data is produced in much the same way that a radio program would be broadcast, which means there is an upfront fixed investment in building an infrastructure. And then adding additional listeners to that market data comes with some incremental costs, but it is *de minimis*. It is plugging cables into a switch.

We experienced this firsthand when IEX, before we traded our first share, we were subscribing to market data. We were paying over $1 million for market data, but you don't just pay for the data itself. You pay in the method with which you receive the data. You have to buy the cable. You have to rent the cable.

If you look at the New York Stock Exchange for their most expensive, fastest cable and it is almost half a million dollars a year to rent that cable. And the cable itself is $500 for a pair of them one time. It gets pretty distortive.

Now, you could say, well, we plug these cables into a switch. But even if you allocate cost per switch, you are probably talking about a couple thousand dollars, $4,000 one time, which you are renting to me for almost half a million dollars a year.

So I would say that it is distortive. It is probably 95 percent plus margin, if we really got into the details. And we should look at those details, because when you are required to buy market data, it begs the question whether the prices for those data has any relationship with what it costs to produce it.

And the challenge becomes is, as Chris said, we compete, there is no competition for an exchange producing their own data sold with access that they deliver in that datacenter. And I think that it is not a competition.

Mrs. MALONEY. OK. My time is almost over, so I would like to ask unanimous consent to place in the record statements and documents from Healthy Markets' "Transparency and Trust" and ModernIR, "Market Structure."

Chairman HUIZENGA. Without objection.

Mrs. MALONEY. Thank you. My time has expired. Thank you. Thank you all.

Chairman HUIZENGA. The gentlelady yields back.

With that, the chair recognizes the gentleman from Minnesota, Mr. Emmer, for 5 minutes.

Mr. EMMER. Thank you, Mr. Chair, and thanks to the panel. Mr. Wittman, if you would tell us about the current liquidity for the top 100 or so stocks listed on NASDAQ. Some say the structure is broken. Is that visible in most stocks, and if not, where is it visible?

Mr. WITTMAN. Well, I think if you look at the liquidity profile in the top 100 stocks, there is a tremendous amount of liquidity. I think that is charged a bit with—in other committees or other market structure advisory committees—if you take a look at some of the rebates for those very liquid securities, you probably don't need a 30 mil rebate in order to liquefy those securities.

So we are looking at the small, mid-sized companies, getting these companies to go public, and make sure that we have got a good reference price for those. And I think it is there where we struggle.

Two factors: rebates, tick sizes, and maybe a third one would be off-exchange trading. The market makers that are in the public markets trying to fight the trade order flow, don't see that order flow in public markets, but they see them in ATSes. So those three factors, I think, is what we need to work on to charge the mid-and small-sized companies' liquidity.

Mr. EMMER. Thank you very much. Let us just go another step. So I think you testified, or I read it in your testimony, that

NASDAQ has supported the idea of intelligent tick sizes, and this is Mr. Wittman still. How would that compare to the Tick Pilot regime that is in place today?

Mr. WITTMAN. So I think what we have done is we have taken a one-size-fits-all market, and then we have carved out another piece and put it into three buckets. So it is maybe three sizes trying to fit everything.

I think in the Tick Pilot, there are some good and some bad, and I think you need to take a look at the securities that are reacting better and worse and be more intelligent about the size of the tick. They may be tick constrained, and also, with the same conversation, look at rebates because I think they are going to be tightly interwoven.

Rebates for those securities and the size of the tick, whether it is pennies, nickels, dimes. There are securities that trade in a penny market that they could literally trade in probably a quarter of a penny market. So it is tick constrained. It could be even smaller.

Mr. EMMER. Mr. Concannon, I think you also talked about tick sizes. Do you have any comment?

Mr. CONCANNON. Yes. I would agree wholeheartedly with Tom on that concept. The one-size-fits-all clearly doesn't work. With regard to the NASDAQ 100, they are performing exceptionally well.

Retail investors are experiencing phenomenal execution quality in those products, and institutional investors are able to move large sizes of liquidity through our market. So I do think at the top end of our market we have a robust and efficient market, and it is working.

As you go down the tier of volume and liquidity, there are adjustments that we needed to make. One adjustment is clearly the tick size. The Tick Size Pilot does attempt to take a step in that direction.

Mr. EMMER. But it is only adjusting it in one direction.

Mr. CONCANNON. It is only adjusting in one direction, and it is fairly simple in its approach because it is a pilot. So there is more that we can do to really change how Reg NMS, which is a one-size-fits-all rule, treats each stock individually, based on its liquidity, based on its market cap.

Mr. EMMER. Mr. Comerford, you were talking a little bit about this tick size as well and how it impacts what you do. We talk about, or at least the last panel did, and I think to some extent this panel has—we talked about how the cost of trading has gone down in the last decade plus, but what we are not talking about is where we have—well, we are talking about it, but not directly.

With the reduced tick, the decimal system and the reduction in cost, what has this meant for the research and the analysis on different companies that is available to people out there?

Mr. COMERFORD. Well, if I could first talk a little bit about the tick sizes really quickly. My point is that there are actually large-cap names that have the wrong tick size. So Alphabet has the wrong tick size.

That is not enough consideration for liquidity providers to provide depth to the markets. So I think that we have to look not just at the liquidity of the stock, but also at the price of the stock.

And we can also look across the Atlantic, where with MiFID II, EMSAC is making a change where they are changing and they are creating a tick size schedule. They already have tick size schedules based on price. They are creating tick size schedules based on price and liquidity.

And because they are doing that, they are going to set up markets that are more uniformly orderly in their trading, maybe not uniform in their tick size, but uniform in their trading.

Mr. EMMER. Thank you very much. I see my time has expired.

Chairman HUIZENGA. The gentleman's time has expired.

With that, the chair recognizes the gentleman from Massachusetts, Mr. Lynch, for 5 minutes.

Mr. LYNCH. Oh, thank you. Thank you, Mr. Chairman. I want to thank the panelists for coming before the committee and helping us with their work.

Mr. Katsuyama, really appreciate the work you have done to democratize the markets, and I have one question though. It is a rather curious sort of oddity. So you have adopted this speed bump. This, what is it, 350—how long is the delay now?

Mr. KATSUYAMA. Three hundred and fifty millionths of a second.

Mr. LYNCH. Yes, OK. That is what I thought. And I think that has—well, let me ask you, do you think it has accomplished its goal?

Mr. KATSUYAMA. So I do think it accomplishes the goal we set out to which ensures essentially a lot of people view the race as a race between participants in the market, a fast trader versus a slow trader. We can't equalize necessarily that race, because you can't ensure that everyone gets the same information at the same exact time when people are in different geographies, different technologies—

Mr. LYNCH. Right.

Mr. KATSUYAMA —Et cetera. Three hundred and fifty microseconds is really designed to ensure that IEX, as the market center that is pricing trades for buyers and sellers, that a participant can't get information and effect a trade on IEX before we get that same information, which gives us the ability to essentially price trades accurately and fairly.

Mr. LYNCH. Yes.

Mr. KATSUYAMA. I think that the challenge that we have is that when market centers, when exchanges are incentivized to sell tiers of speed, like microwave services, but then they use fiber connectivity to price trades in their market, they are essentially selling people the ability to know prices before they do.

Mr. LYNCH. Right.

Mr. KATSUYAMA. I think that undermines the fairness of the market, and I think undermines confidence in trading.

Mr. LYNCH. I get that. I get that. I only have 5 minutes though, Mr. Katsuyama. So do you think it has been working? Would it be fair to say it is working? It seems to have equalized or brought closer together the high-speed trader and the average investor out there.

Mr. KATSUYAMA. I think that what it has done is it has taken a certain segment of high-speed trading that essentially is wait-and-see arbitrage, and it has minimized that—

Mr. LYNCH. OK. I agree.

Mr. KATSUYAMA —Which is—

Mr. LYNCH. And that is a good thing. I thank you for that. The curious part is that I know you wrote a letter to the New York Stock Exchange on their American Exchange, the smaller fund there, made a move to adopt a similar 350 millionth of a second speed bump, which doesn't sound like a lot, but I guess it is.

And IEX, much to my surprise, wrote a letter against them adopting a speed bump. Now, if it is just competitive advantage that you are seeking, I am OK with that, but if there is something else there—

Mr. KATSUYAMA. Yes. The letter actually didn't oppose the fact that a market wanted to copy exactly what we had built.

Mr. LYNCH. OK.

Mr. KATSUYAMA. The letter asked that the New York Stock Exchange clarify why they wanted a speed bump, because the irony is that the speed bump is required because of the things that New York Stock Exchange and ARCA sell to their participants. So New York, on two of their exchanges, is enabling traders to trade at very high speeds—

Mr. LYNCH. Yes.

Mr. KATSUYAMA —which—and we, as a market, need to protect ourselves. So we found it ironic that New York wanted to launch a speed bump market to protect people in that market from the two other markets they run. We wanted them to tell us why.

Other than just we want to give people choice, because if really choice is about investor protection from high-speed trading practices that are predatory, then why wouldn't everyone make that choice? And I think that gets to the heart of really my written and verbal testimony. People are being paid to make choices that are contrary to their clients' interest.

Mr. LYNCH. OK.

Mr. KATSUYAMA. So we are OK with competition. We are not OK if that competition doesn't clearly state the purpose of the market that you are trying to build.

Mr. LYNCH. All right. That is fair enough. Thank you. Thank you for clarifying that. And I appreciate the good work that IEX is doing, and I am a fan.

Mr. KATSUYAMA. Thank you.

Mr. LYNCH. Mr. Wittman, can you talk about the current liquidity that is seen by the top 100 or so stocks that are listed on NASDAQ versus everybody else?

It seems all this talk about liquidity is great for the well-known stocks and highly traded stocks, but I also suspect that there is a dearth of liquidity if you are a smaller company, a startup, more of the innovative and smaller companies coming up. And there are some that say that the market structure is broken in this respect. Can you—

Mr. WITTMAN. Yes. I think it goes back to our one-size-fits-all kind of conundrum, where you have got rebates and markets structure that may be working for a class of securities, and they are probably the very liquid securities. You can make arguments that those tick sizes should be smaller and that rebates could be smaller in those names.

We are focused on those mid- and small-cap names. They are under-liquified. We have talked about proposals to have unlisted trading privileges revoked for those, have them trade on the exchange and try to pull that liquidity into those securities.

And at the same time, as part of my testimony, I talked about more than 50 percent of trading in those kind of securities are trading off-exchange. So there is less and less of a reason for market makers to liquefy those securities, which is a concern.

Mr. LYNCH. Thank you.

I thank you, Mr. Chairman, for your courtesy. Thank you.

Chairman HUIZENGA. The gentleman's time has expired.

The chair recognizes as this time Mr. Hollingsworth from Indiana for 5 minutes.

Mr. HOLLINGSWORTH. Hey, good afternoon. I really appreciate everybody being here.

The first question I wanted to ask was actually to Mr. Wittman. You had said something earlier. You said, "We have gotten to the point where the costs outweigh the benefits in terms of the dispersion of trading in order fulfilment venues." Can you walk me through some of that analysis and your thoughts on that?

Mr. WITTMAN. Yes, I think as you add fragmentation—so there has been, Chris and others have talked about—

Mr. HOLLINGSWORTH. Right.

Mr. WITTMAN —it spurs the ability to startup new exchanges. We have six medallions. We could start three new equity exchanges. And those are protected venues. So there is cost associated with all of our customers, all of our members and broker dealers.

So there is cost to them, so what is the actual benefit that we can bring to those and to the marketplace? And you can only get to a certain level of some creativity there.

Mr. HOLLINGSWORTH. Right.

Mr. WITTMAN. We think we can probably do a few new things, but that is why we say, and that is what I say that cost is starting to get to the point with Reg NMS that I think we have overstayed our welcome with those protections.

Mr. HOLLINGSWORTH. OK.

With Mr. Farley and Mr. Wittman, earlier today, I heard some testimony from individuals that talked a little bit about how, in their view, and in their humble opinion, that order or execution quality was significantly poorer on exchanges for small retail mom and pop orders.

And they talked about how that divergence doesn't seem to be getting smaller. Instead, it seems to be the same or getting wider over time as alternative venues to order fulfillment seem to be better. Can you talk a little bit about why that might exist and why that divergence seems so great today or as great today as it was 3 or 4 years ago instead of converging?

Mr. FARLEY. Pardon me, could you just repeat, what is the diversion you are referring to?

Mr. HOLLINGSWORTH. Yes. So earlier today there was some testimony that for mom and pop kind of order, classic retail investor orders that the quality of execution on exchanges versus other types of venues is significantly poorer.

They talked about how so many orders tend to be fulfilled outside of the spread instead of inside the spread. And they felt like they were making up spread by going elsewhere.

It as curious to me why that hasn't converged over time and why exchanges haven't gotten more and more competitive with regard to kind of retail order.

Mr. FARLEY. Yes. Generally, it was a little head-scratching for me. There were a couple comments in a row arguing that executions on exchanges, including New York Stock Exchange, are worse than executions off-exchange, which is the opposite of what I have seen.

But there is a notable exception, and it relates to this conversation of tick sizes. So take Bank of America stock, very large company, high market cap, very liquid, low-priced stock. Let us call it 20 bucks.

Mr. HOLLINGSWORTH. Yes.

Mr. FARLEY. An exchange trades it at $0.01 increments. But the theoretical spread for that stock may be one-tenth of a penny or one fifth of a penny or you get the idea.

Mr. HOLLINGSWORTH. Right.

Mr. FARLEY. On an exchange, we can only execute at a penny.

Mr. HOLLINGSWORTH. Right.

Mr. FARLEY. Now, we can do a midpoint or half a penny, but no real variations in between. So actually, there is an ability for retail trades on dark pools and non-exchange venues to customize that, execute a price at a better value for a particular retail trade or on a particular trade.

So there is one real disadvantage that we have, and to some extent we have our arm tied behind our back because of that, but also because those dark pools can pick and choose exactly who can play in their venue and pick and choose exactly what the economic terms are. So that is something that we wrestle with.

Mr. HOLLINGSWORTH. OK. Last question, and this is probably too much curiosity, but I hear and have seen a lot of demonization of high-frequency traders. Do they provide any benefit to the markets, not just to themselves, but to markets overall?

And I will start with Mr. Farley and then Mr. Katsuyama.

Mr. FARLEY. Yes. Proprietary market makers are hugely important for our markets, and we do what we can to attract them. We do not demonize them.

Mr. HOLLINGSWORTH. Yes.

Mr. FARLEY. And we appreciate their business.

Mr. HOLLINGSWORTH. Fair enough.

Mr. KATSUYAMA. I think the term is too broad to think that everyone is going to use technology today to purely provide charitable benefits to the rest of the economy is not accurate.

Mr. HOLLINGSWORTH. Right.

Mr. KATSUYAMA. I think there are some high-speed traders that use technology to benefit the markets, and there are some that very specifically do not. And I think that it is the exchange's role to ensure that those who do not—

Mr. HOLLINGSWORTH. But we—

Mr. KATSUYAMA —don't have as important of a role to play in the market.

Mr. HOLLINGSWORTH. Well, I don't believe they are doing it for charitable purposes, but the old Adam Smith, people following their own profit motives may lead to better outcomes for all of us together. I am just curious whether those trades play some role in adding more and more liquidity to the market.

Mr. KATSUYAMA. So those who add liquidity, I think, do provide some semblance of positive aspects. It is those who remove liquidity.

Mr. HOLLINGSWORTH. Yes.

Mr. KATSUYAMA. A recent academic study said that. And when studying electronic traders, they are adding to the thick side of the book and removing liquidity from the thin side of the book. And their ability to remove liquidity is actually faster than those regular. So it is creating more volatility rather than dampening.

And one other aspect, just on your prior question is, I do agree with Mr. Brown, in talking about exchange execution quality not necessarily being as good inside the spread.

This relates back to my prior comment to say that when an exchange trades inside the spread, it is their responsibility to determine the price inside the spread, i.e., what the midpoint is.

Mr. HOLLINGSWORTH. Right.

Mr. KATSUYAMA. So when you are selling people the ability to understand the midpoint before you do, anyone who rests an order there gets picked off.

Mr. HOLLINGSWORTH. Yes.

Mr. KATSUYAMA. So if you are consistently picking off people who are resting liquidity, you are not going to have as much liquidity inside the spread.

Mr. HOLLINGSWORTH. Right.

Mr. KATSUYAMA. IEX has built something differently, which is back to Mr. Lynch's point, which is why things are successful. So exchanges could improve the execution quality, but it would come at the expense of selling high-speed data and technology, which is not necessarily in their best economic interest.

Mr. HOLLINGSWORTH. That is fine. That is fine. Makes sense. Thank you.

Chairman HUIZENGA. The gentleman's time has expired.

With that, the chair recognizes the gentleman from Georgia, Mr. Scott, for 5 minutes.

Mr. SCOTT. Thank you very much, Mr. Chairman.

Mr. Farley, I grew up in a little town called Scarsdale, New York. And when we were kids in Fox Meadow High School, our class project was to go out, earn our own money and go down to the New York Stock Exchange and buy stock. It was a very pivotal time in my life, the closeness.

So I want you to understand how much affection I have for the New York Stock Exchange. And I am invested in stocks ever since, and it helped me in my education all the way up to the Wharton School of Finance at the University of Pennsylvania, that exposure.

So I was very concerned when I found out today that the New York Stock Exchange trading is in decline. Could you tell me why?

Mr. FARLEY. First of all, Congressman, I skip to work every day, in part, because I get to hear great stories like yours. In fact, War-

ren Buffett, and he said I could quote him on it, told me when he was 10 years old, he visited the New York Stock Exchange—

Mr. SCOTT. Yes.

Mr. FARLEY —and it set him on a path to free enterprise the rest of his career.

Mr. SCOTT. And—

Mr. FARLEY. So thank you for sharing that. Thank you for your great work in the 13th, and as you know, we are dually—or you may know, we are dually headquartered in Georgia and New York, so we are a proud Georgian company.

Mr. SCOTT. And that is why when Jeff Sprecher said that you all were buying the New York Stock Exchange, man, what a great thing that was. That is why I am anxious to hear you say why the trading is in decline.

Mr. FARLEY. Well, I appreciate you giving me that opportunity, and reports of our demise are very premature. I don'twant to crow about our success, but our trading is not in decline.

We are the market leader and the global leader, Congressman, both for trading, absolute number of shares, but of more pride to me in terms of listings we lead the world. We are still a beacon for free enterprise throughout the world.

This year we lead the world in IPOs and follow-ons and equity volumes, so you need not worry. We are not in decline.

Mr. SCOTT. OK. Another question I have, Mr. Farley and other members, I am really worried about terrorism and cybersecurity needs. Could you all share with us, I mean, I do not want you to tell us too much because you have a lot of people out there who would do us harm.

But what is the status of it? What can we in Congress do or need to do? Because quite honestly, I believe that the cyber terrorism is the greatest threat to our country right now.

And I think you all see that as you look more and more at what Russia is or is not doing and other countries, and even those who really want to do us harm, like ISIS. Do we have to worry? Do you guys have it in secure shape for the nation?

Mr. FARLEY. We, too, at the New York Stock Exchange and I suspect my colleagues share your concern, both in terms of physical attacks and cyberattacks, and just to answer your question directly, anything you can do to encourage public-private partnership information sharing with the agencies on a real-time basis, as well as allowing competitors to share information free of concerns about collusion and anti-trust, anything you can do in those realms is very helpful.

Mr. SCOTT. All right.

Yes, sir, Mr. Concannon?

Mr. CONCANNON. Yes, I would love to add, we all compete very aggressively for every share, every market share in our market. But when it comes to cyber, that is when we all partner. And that is the key, as Tom mentioned.

The ability to partner and share information about recent penetration attempts or any signals that we are seeing as a result of cyberthreat, it is a critical area for our markets.

I will tell you that all of our markets can only be accessed through a proprietary network. So there is no Web-based access to

our production platforms in the datacenters that they sit. So it is very hard for cyber to penetrate those networks.

That doesn't mean we don't take extraordinary protections of those networks because I agree with you that that is one of our No. 1 threats is cyber trying to attack our, just generally speaking.

Mr. SCOTT. Yes.

Thank you, Mr. Chairman, appreciate it.

Mr. EMMER [presiding]. The gentleman yields back—

Mr. COMERFORD. If I could add one thing there—

Mr. SCOTT. Yes.

Mr. COMERFORD —not as an exchange? One benefit of the fragmentation that people don't complain about a bit, one benefit is that I believe we have tremendously resilient markets. So we do not have a single point of failure.

There are different places to trade. The exchanges are talking about how they can provide resiliency amongst the exchanges, and I think that that is really good for the market.

Mr. EMMER. The gentleman's time has expired.

The chair now recognizes the gentleman from Ohio, Mr. Davidson, for 5 minutes.

Mr. DAVIDSON. Thank you, Mr. Chairman. Thank you to our guests. I really appreciate your written testimony, and what you have already shared with us today. So it is an honor to talk with you.

Mr. Concannon, I wondered if you can add some clarity to the consolidated audit trail that has been in the works for a long time. Two things, one, it doesn't include futures trades, which your firm knows a fair bit about.

And two, and I will expand this to all of you at a point, it seems that your firms actually sell data that we would already want to know as part of this audit trail. I guess what is different about the data you already have other than it would be standardized if you put it into some other package?

Mr. CONCANNON. Great question. I do think there is some confusion about the consolidated audit trail and where things stand with regard to our current surveillance systems. The consolidated audit trail was originally crafted in response to the Flash Crash and an effort to understand the market in-depth.

Right now, FINRA sees all of our data. Everyone sitting here shares their data, their full depth of book to FINRA, and FINRA also has the entire OTC market in their data base and surveils that data either on behalf of the exchanges, which we also surveil our own data, but also on behalf of FINRA's own members.

So today, there is a very vibrant system of surveillance across not only our equity markets but also our options market. And the consolidated audit trail is the next step in the evolution of surveillance in the U.S.

So we are not missing things today. It is critical that everyone understands that our public markets are today protected by some of the most sophisticated surveillance by the New York Stock Exchange, NASDAQ and obviously the CBOE.

The consolidated audit trail is taking a lot longer than we would want. There are some sizable costs that the industry is going to have to bear to install it to finish the completion of the build. And

I think the SEC is going to continue to evaluate what those costs are and the benefits given how much FINRA does today in surveilling our market.

Mr. DAVIDSON. Thank you.

Yes, Mr. Farley?

Mr. FARLEY. Can I just make one quick comment, perhaps tying something that Congressman Scott said together with this conversation about the CAT.

There was a decision made with the CAT to include personal identifying information of all market participants as part of the CAT. That gives us great concern that one entity will have access to all of this sensitive personal information from every man and woman who participates in the equities markets.

Mr. DAVIDSON. Don't you already sell that information though? Like if I were a broker I could buy stuff to track some of this stuff or not?

Mr. FARLEY. No, we don't have—as far as I know we don't have any. And that is of considerable concern for us and it is going to lead to a lot of the cost of the CAT in procuring that personal identifying information.

Mr. DAVIDSON. OK. So here is the challenge that people say, hey, one of the reasons we need this, obviously with the Flash Crash and everything else, talk about cyber, talk about manipulation on a very large scale, sure it is hard.

I don't know how many new markets are launched a day. I think it is less than one a day, but it seems like they are new all the time, right? And I don't know what the theoretical max of numbers of markets are for the United States, but it looks like we are on a path to discover that.

If I am trying to solve a problem, I am a manufacturing guy, collecting data is really vital. How do you determine a root cause? How do you determine what went wrong, when it went wrong. You can't fix it without knowing certain things.

If none of that is knowable, which is the whole point of CAT, what would be the fix? I mean, FINRA has already got the truth or what?

Mr. CONCANNON. Yes. I mean, right now the key to surveillance is the data, as you mentioned, and consolidating all of our market data in one place that then can be surveilled for patterns of behavior, that exists today. It is called FINRA.

We share our data with the regulator called FINRA and they provide surveillance services on behalf of the exchanges. We, too, each of the individual exchanges sitting here, also surveil that data to look for our own patterns to ensure that FINRA is finding everything that they can find.

So I would say we are in a very good state when it comes to surveillance of our markets and CAT is the next step. And I would agree with Tom, the introduction of personal information into CAT and that has exploded the cost of CAT, and mostly as a result of the potential cyberthreat and the demand and access for that information.

Mr. DAVIDSON. Thank you all. I am sorry I couldn't get to more. My time has expired.

Mr. Chairman, I yield back.

Mr. EMMER. The gentleman's time has expired.

The chair recognizes the gentleman from California—

Mr. SHERMAN. My first question will—

Mr. EMMER —Mr. Sherman for 5 minutes. Sorry.

Mr. SHERMAN —build on Mr. Scott's question about getting more companies listed and available for investment by the general public.

Mr. Wittman, I understand that the number of public companies was 8,000 back when I got to Congress in the 1990s, and is now down to 4,000. Now, there are a number of things that could have affected that, such as the dotcom bubble or the 2008 crisis or maybe it coincided with me coming to Congress.

In any case, the trend seems to be that companies are staying private longer. Facebook, a lot of us would have liked to invest before 2012. What are the benefits of public markets and exchanges like NASDAQ, Mr. Wittman, and what do we do to try to get a greater percentage of companies to go public and perhaps earlier in their development process?

Mr. WITTMAN. Yes, this is an area that we are manically focused on, and I think to get a full feel for it, if you look at "The Project Revitalize It" that we published, you will get a good feel for it.

But there are more and more companies that are electing to stay private. Private equity is involved with that. As a company attempts to go public there are a lot of frivolous lawsuits that put the fear into some companies. Maybe the burdensome 10-Q process, which we look to maybe revamping that.

But all in all, I think that we can make some changes to the process for these companies to make it easier for them to go public and maybe we can get this turned around for the small and mid-sized companies.

Mr. SHERMAN. Not only easier to go public but perhaps less burdens on being public. But at the same time some of the things that we have imposed on public companies, such as conflict diamonds and conflict minerals rules. We ought to figure out a way to apply those to public companies if they are important.

If they are important that our society know about that, that is a burden should fall on major private companies as well. If it is not important and you impose it on public companies, you disadvantage going public.

Mr. Katsuyama, your fellow exchanges charge for market data. You don't. Why don't you? Should they? Should you?

Mr. KATSUYAMA. Yes, so when we look at what it costs to produce and distribute this market data, we build that into a trading fee. And I think that market data in many ways is interconnected with the system of paying out rebates or kickbacks for order flow.

The net revenue from trading continues to decline for exchanges because when you are paying $2.5 billion a year for people to trade on your market you have to find ways to make money elsewhere. So those sources end up becoming listing fees, market data fees, technology, other connectivity costs which are skyrocketing.

And I think that is what you have heard from the industry today is that the industry is under the weight of those increased charges, but those charges in many ways are related to make up for the fact that all of this money is being paid out for rebates.

And I think that the challenge has become that we have packed regulation on top of managing this conflict. Things like a ban on locked markets, access fee cap, you look at some of the regulation that we are struggling with they are designed to manage a conflict as opposed to just addressing the conflict head on.

And in many ways an efficient market, a competitive market shouldn't really allow for kickbacks. And I think that—

Mr. SHERMAN. But the—

Mr. KATSUYAMA —that is what we struggle with. And I think that is a universal—

Mr. SHERMAN. Well, let me cut you off there—

Mr. KATSUYAMA —sore point.

Mr. SHERMAN —because I am going to try to squeeze in one more question.

Mr. Farley, are there any listing standards on your exchange in terms of the rights of minority shareholders or the efforts of management to create total security for themselves, whether they are acting in the best interest of shareholders or not?

Do you require that shares be voting shares or that cumulative voting be allowed or is there any protection or is it whatever the government will allow?

Mr. FARLEY. Yes. The short answer is yes, but I don't have our listing standards committed to memory. And so there certainly are minority shareholder protections and there are rules around voting. But is there one question in particular that you were more interested in hearing the answer to?

Mr. SHERMAN. Basically all of the efforts to protect shareholders and especially minority shareholders.

Mr. FARLEY. Yes, sure, but if OK by you I will go back and—

Mr. SHERMAN. And I look forward to getting your—

Mr. FARLEY. Yes, thank you.

Mr. SHERMAN —answer for the record.

Mr. FARLEY. I will submit it to you.

Mr. SHERMAN. And I yield back.

Mr. FARLEY. Thank you.

Mr. EMMER. The gentleman's time has expired.

The chair now recognizes the gentleman from Arkansas, Mr. Hill, for 5 minutes.

Mr. HILL. I thank the chairman. Appreciate the panel being with us today and this is a really important topic. It is one that we have got two great panels on today, and I appreciate everybody expressing their views candidly to try to help us move this topic forward.

Appreciate IEX's innovation and leadership in the market, and Mr. Katsuyama, I appreciate your prepared testimony, which I looked at but I am—and the comments you just made.

I am interested in getting Mr. Farley's response to that you were asserting maybe that broker-dealers, because they are paid for order flow, were ignoring their best execution responsibility, which I think that is what you asserted.

I just would like Mr. Farley's response to that because that is an important—I know where you are coming from but I would love to hear Mr. Farley's response to that.

Mr. FARLEY. Sure. As I see—

Mr. HILL. Well—

Mr. FARLEY. And indeed you are right. On the floor of the exchange I think we were in front of the Dillard's sign there.

I think broker-dealers are conscientious actors. And so I didn't come here to demonize one particular market segment or another is the short answer to that question.

Broker-dealers and others acknowledge that there is an inherent conflict of interest with respect to rebates. The question is how do you set up the right structure to deal with that? Over time how do we minimize the existence of that conflict of interest?

You didn't find our testimony riddled with accusations. There are a lot of good actors in this market. And we should all work together to minimize conflicts while keeping the listed company in mind.

Mr. HILL. Well, do you think that the dealer community and the asset manager community should be involved in the oversight of the SIP—

Mr. FARLEY. Yes.

Mr. HILL —process?

Mr. FARLEY. Yes. And with the way we have advocated for is we have an advisory committee that we have made more and more active over time. And if we are not taking in those views then we are going to have incomplete policymaking.

Mr. KATSUYAMA. May I respond to that?

Mr. HILL. Yes, Brad, yes.

Mr. KATSUYAMA. So I think two things. I think if you ask anyone on the advisory committee whether they feel like that is a valid committee and role I think they would say no. So I don't think that that gives the full amount of transparency that people are looking for in the industry.

I think the second part is that, yes, some brokers do manage this conflict well. Others don't. I think the ones that don't actually end up making more money. I know from a broker standpoint routing for rebates makes your business more profitable. It delivers worse results to your client.

And if you just look at public data, publicly available data, the longest lines to buy or sell stock are on the exchanges with the lowest likelihood of getting executed and the worst execution quality after you buy or sell shares. They have the longest lines.

In any business, in any state of humanity, no one will get on the longest line for the worst outcome. That is what exists today. So I don't need to accuse anyone of anything. Look at public data. The public data tells you everything you need to know.

Mr. HILL. Thank you, Mr. Katsuyama, good conversation on that issue.

Mr. Comerford, you noted in your testimony that Instinet only considers a third of all U.S. stocks to have the right-sized minimum price increment. Could you peel that back and give us a little bit more information on that assertion?

Mr. COMERFORD. Sure. Thank you for the time. So what I was talking about is if you think about the one-size-fits-all tick size, absent the tick pilot that we have in our market, the penny, a penny is a very different percentage on a $10 stock and a $100 stock and a $1,000 stock. And we have $1,000 stocks in our market.

My point is also that the tick size, more than anything, even more than the access fee, is still the No. 1 reason why people dis-

play liquidity. We know that when the percentage, when the consideration—the markets work better when costs and considerations are balanced, when the costs and considerations are balanced between liquidity providers and liquidity takers.

I think of it like a balloon. If you squeeze it too hard in one place it is going to pop out somewhere else. When the tick size is very large as a percentage terms, what happens is that the consideration for liquidity provider is high.

That means that a bunch of liquidity providers want to provide liquidity we get very deep queues, the long lines. We get long lines across all exchanges, whether they are maker-taker, inverted, or IEX. And that contributes to the complexity and difficulty to trade.

The other side of the equation is when the stock price is too—when the stock price is large and the tick size is too small, there is very little incentive for liquidity providers to provide liquidity. Spreads actually get very wide.

A lot of the trading actually happens inside the spread and again, it is very complex and I think that does not contribute to confidence in our market.

Mr. HILL. Thanks for your perspective on that.

Mr. Chairman, my time has expired.

Chairman HUIZENGA [presiding]. Time has expired.

And that is votes being called, but we are going to try to get through these last two here.

Mr. Poliquin from Maine for 5 minutes.

Mr. POLIQUIN. Thank you, Mr. Chairman, very much.

Thank you all very much for being here. I appreciate it. It seems like everybody in this room, and they should, has a great story about the equity market, about capital formation, about jobs, about savings.

When I was a kid growing up in a small town in Maine, I used to go over to my buddy's house all the time. In particular because of his dad, who was the only person in town who bought a copy of the New York Times.

It was the only copy in town and the reason why he bought the copy of The New York Times is because there was a quote section for the stock market. And that was way before most of you folks were born.

But in any event, I was absolutely fascinated to understand that someone who grew up in a small town of Maine and dug sewer lines and painted metal roofs and cut grass could buy a piece of the American economy. How cool was that? And grow with the economy and grow with these companies.

And I still have the first share, one share of Bath Ironworks my dad bought me for Christmas when I was 12 years old. But in any event, it is good when you people help us help retail investors, savers for their retirement, savers for feeble, for their kids go to college.

It is good when you help them go public so these companies can grow and create jobs and pay their employees more and savers and investors can grow with the companies that you bring public.

And it was Mr. Sherman, I believe, that mentioned this a minute ago, that we only have half the number of companies that are public today that were 20 years ago. That is not good for America.

So my question to you Mr. Farley is why do you think this is the case? I know Mr. Wittman mentioned a couple issues about lawsuits and so forth and so on or the liability of lawsuits when you go public.

In your opinion sir, why do you think we have so few companies that have decided to go public instead of staying private? And how can we fix that problem, sir?

Mr. FARLEY. First I was hanging on your every word. I couldn't agree more. We have the IPO of Blue Apron coming up this Thursday. Those are the best days of the exchange. That is money going into a great business that can go make the world a better place.

There are a number of issues. I mean, there is—and please don't quote me on this exact figure. I could be wrong a hundred either way. But over the last 10 years I believe there have been 3,500 shareholder class action lawsuits.

Mr. POLIQUIN. Yes.

Mr. FARLEY. So if you are a public company there was a pretty good chance you had to deal with one of those. And if you are Bar Harbor Bankshares in your district, that is a big deal.

Mr. POLIQUIN. It is a very big deal. That is a great company.

Mr. FARLEY. If you are JPMorgan it is a less big deal, but if you are Bar Harbor Bankshares that is a big deal. If you have to deal with a proxy advisor's report that was published without your knowledge that inadvertently includes erroneous materials, you are behind the eight ball with shareholders. And that is a difficult situation to be in.

Similarly, if you look at Sarbanes-Oxley 404, that was a vote that passed in the Senate I believe unanimously, maybe 99 to zero. So this was something that had—it was good policy intended there.

What wasn't intended is that it would get bigger and bigger and bigger every year. And every year there are new rules propagated by the regulators that is making it more and more onerous to comply with.

And then finally there is a shareholder ownership reporting regime that is over a generation old in this country. These companies are frustrated that they don't better understand their shareholders. Who shorts their stock, who owns options and what the value of those options are and somewhat more real-time information about their shareholdings.

Although that is a more complex issue because those shareholders would argue, and rightfully, there is real intellectual property in it.

So there is a roadmap there to bring America back to that period of 350 being the minimum number of IPOs, to allow the Bar Harbor Bankshares to flourish, but it is going to take not just work from those of us at this table but some of the work here in Washington as well.

Mr. POLIQUIN. Mr. Farley, I really appreciate these comments. Mr. Farley, let us talk a little bit about short selling. We may as well. You can do it. You can bet against a company by borrowing the shares at a certain price on promising to pay them back at a later date. And if in fact the company shares go down you make money.

What do you think about that and how does that impact a company's decision that is private on whether or not they want to go public?

Mr. FARLEY. It is. I have an emotional reaction which almost feels kind of icky and un-American. You are betting against a company.

But the data-driven reality is, if you get into the numbers, allowing short selling in the economy is actually good for capital formation, tightens spreads and allocates the capital to the right companies at the right moment in time.

So the real issue that our listed companies have isn't about short selling. In fact, very infrequently do I have a company argue it should be banned in its entirety. What they say is let us have a little more transparency.

We have to report as investors our long positions every 90 days, but we don't have to report our short positions. And just arming the company with a little more information like that could help make being public more appealing.

Mr. POLIQUIN. Thank you gentlemen, appreciate it very much.

I yield back my time, Mr. Chairman.

Chairman HUIZENGA. The gentlemen yields back.

The chair recognizes the Vice Chairman Mr. Hultgren.

Mr. HULTGREN. Thanks. As we all know there are votes and there are three of us that still want to have a quick question, so I am going to just ask about a minute, if that is all right?

Mr. Concannon, if I can focus on you, thanks again for being here. Thanks for the great work the CBOE does. Wonder if you could respond quickly, I know the assertion that Mr. Katsuyama made as far as if you could just respond to that I want you give you a few minutes.

Mr. CONCANNON. Sure, I appreciate that. This notion of banning rebates, it lacks understanding of how our market works. Really we have—what he fails to mention is that the large majority of the, what we call liquidity rebates, go to dealers not brokers.

They actually go to market makers trying to form price in our market. These market makers support small companies. They support small ETFs, newly issued ETFs that demand that support and the large broker dealers.

Now, I agree that some of the size of the rebate probably should be modified as a company becomes more liquid. And this is part of the problem with the one-size-fits-all that we talked about in the context of Reg NMS.

While we do regulate this process, and we do attach obligations to our market makers to support these stocks in return for these rebates, it is a highly regulated part of our market.

Let me continue by saying that when brokers receive rebates, they are still subject to best execution. It is somewhat insulting to suggest some of the largest brokers in our country are not performing their best execution obligations because of a conflict of interest.

There will always be a conflict of interest. We have so many different markets to route to and decide about. There are going to be conflicts of interest. We can't outlaw them.

It is really how do they deal with those best execution obligations. They have full committees that analyze data. We can change price, and we don't see the market react because of best execution obligations.

When you look at where the rebates are flowing, again, these are proprietary market makers that are choosing to post bids and offers and form price in our market. That is something that is not done in IEX.

IEX is largely a dark pool that wrapped itself in an exchange—70 percent of the volume in IEX is dark liquidity. It is not a place where market makers want to quote and form price to the public markets.

So it is a different model. It is a model that someone can choose to route to. But it is different than a traditional exchange that has small companies and small ETF issuers where they need market makers and that market maker rebate helps support that market maker.

Mr. HULTGREN. That is helpful. Thank you very much.

I am going to yield to my good friend Ted Budd for the remainder of the time then. Hold on.

Mr. BUDD. Thank you to the vice chairman and brief question before votes. So Mr. Wittman, so it was 42 years since 1975. Should Congress take another look at the regulatory framework regarding the equities markets?

Mr. WITTMAN. Yes, I think we should. I think we always want to make things better, and I think that is why we are here today and sharing our views. I think you can't rest. You can't be complacent.

I think we take a look at the areas where there are some issues and let us see what we can do to further the conversation and make this market better and get the small, mid-size companies listing on exchanges again and that capital formation that was talked about a few minutes ago.

Mr. BUDD. Thank you.

I yield back.

Mr. HULTGREN. I will yield the balance of my time to Mr. Loudermilk, who has joined us today, so thanks.

Mr. LOUDERMILK. Thank you, and thank you Mr. Chairman for your indulgence being here today. And I will make this as quick as possible and direct my questions to Mr. Farley.

I understand that your business and some of the other businesses represented here today have companies that are affiliates, they are affiliated companies that do work that is not related to effecting trades on the exchange.

Can you define what some of those businesses are and the challenges that you are facing with the regulatory environment?

Mr. FARLEY. Well, actually it is quite broad. We are part of a company called Intercontinental Exchange, Inc., which is by some metrics the largest exchange operating in the world that operates a vast array of businesses from futures trading to data products to regulatory compliance products and services.

And so what we do at the New York Stock Exchange is incredibly important. But it is only a piece of what the overall business does.

Mr. LOUDERMILK. And understand that because of the way that the code is written now that the SEC is expanding the regulatory environment to these businesses that are not involved in the actual exchange operations. Is that true?

Mr. FARLEY. That is exactly right. And so the SEC can determine what is and isn't a facility of the exchange. And that basically gives them nexus or a hook for significant regulation.

And we are seeing that expand, expand, expand to the point where it no longer covers businesses that are or potentially will cover businesses that are not directly responsible for reporting or effecting a trade on the exchange. There are businesses that are just exogenous to what we do at the NYSE.

Mr. LOUDERMILK. And so you see a need to modernize the language to clarify the term facility basically?

Mr. FARLEY. Yes, I think it would be good for everyone. We compete with firms that do not have such regulatory obligations, and it doesn't really assist in the regulation of the New York Stock Exchange.

Mr. LOUDERMILK. And we do have legislation affecting that.

And so with that, Mr. Chairman, I yield back. Thank you.

Chairman HUIZENGA. The gentleman's time has expired. All time has expired. So I would like to thank our witnesses for being here today. I think already we have gotten reports of this being very helpful, very informative. We certainly appreciate your time, your effort for being here.

Without objection I would like to submit the following statement for the record, Committee on Capital Markets Regulation, the U.S. Equity Markets, a Plan for Regulatory Reform.

Chairman HUIZENGA. Without objection.

And without objection all members will have 5 legislative days within which to submit additional written questions for the witnesses to the chair, which then I will forward those to the witnesses for their response.

I ask our witnesses to please respond in as timely a fashion as at all possible. And without objection all members will have 5 legislative days within which to submit extraneous materials to the chair for inclusion in the record as well.

And so on behalf of my friends up here, so as you can see by the countdown clock we do have votes, but I deeply appreciate your flexibility in being here today.

It has been a extremely illuminating and very helpful, I think. And I know that this is hello not goodbye. We are going to be continuing to have this conversation and look forward to working with all of you.

The Chair notes that some Members may have additional questions for this panel, which they may wish to submit in writing. Without objection, the hearing record will remain open for 5 legislative days for Members to submit written questions to these witnesses and to place their responses in the record. Also, without objection, Members will have 5 legislative days to submit extraneous materials to the Chair for inclusion in the record.

So with that, our hearing is adjourned.

[Whereupon, at 1:32 p.m., the subcommittee was adjourned.]

A P P E N D I X

June 27, 2017

Written Testimony of Jeff Brown, Senior Vice President, Charles Schwab

On behalf of the Securities Industry and Financial Markets Association

before the U.S. House of Representatives

Committee on Financial Services

Subcommittee on Capital Markets, Securities, and Investment

Hearing entitled "U.S. Equity Market Structure Part I: A Review of the Evolution of Today's Equity Market Structure and How We Got Here"

June 27, 2017

Chairman Huizenga, Ranking Member Maloney, and distinguished members of the Subcommittee, thank you for providing me the opportunity to testify today on behalf of the Securities Industry and Financial Markets Association (SIFMA) and to share our views on the history and current state of our equity markets. SIFMA represents a broad range of financial services firms active in the capital markets and is dedicated to promoting investor opportunity, access to capital, and an efficient market system that stimulates economic growth and job creation. This Committee's review of the dramatic evolution in our markets over the past few decades is very much welcome by SIFMA's diverse membership.

My personal testimony is rooted in three decades of securities markets experience, beginning in 1981 as an options trader on the floor of the Philadelphia Stock Exchange, later serving on its Board of Governors. Roughly a decade later I joined the staff of the Securities and Exchange Commission, where I served as Senior Counsel in the Division of Market Regulation. Upon leaving the Commission, I led a U.S. project to assist the Government of Romania in creating their emerging securities market before taking a position as General Counsel at the Cincinnati Stock Exchange and chairing the Operating Committee of the National Market System Plan governing NASDAQ securities. In 2003, I joined Schwab as general counsel of Schwab Capital Markets.

With this experience, I would suggest that today's equity market structure is the result of regulatory changes, technological advancements and competition, which in turn has provided investors, including individual investors, with a market that is easy to access with highly transparent and extremely low transaction costs. This capital markets system helps Americans achieve financial security and provides companies with the access to capital they need to grow and create jobs. The United States has the largest percentage of individual investor participation and the deepest and most liquid markets in the world. As stakeholders and policymakers debate possible changes to our market structure, it is critical to remember how efficient and resilient our markets are to the benefit of retail investors that Charles Schwab and others serve every day. That being said, the evolution we have seen has created odd incentives and antiquated systems and everything should be on the table for review.

Evolution of the U.S. Equities Markets

Congress mandated the establishment of a National Market System in 1975 and since then, the U.S. equities markets have undergone significant evolution. In 1975, most equity trading took place in-person on the trading floor of a single exchange. Today's market is fully electronic and automated with a vibrant ecosystem of interconnected but competing market venues, including more than a dozen exchanges and numerous Alternative Trading Systems (ATSs).

The true beginning of the modern market we know today, from both a regulatory and business model perspective, can be traced to 1998 when the Securities & Exchange Commission (SEC or Commission) adopted Regulation ATS. The regulatory structure put in place through Regulation ATS allowed competitive order matching services to operate as alternative trading venues to exchanges subject to a robust SEC regulatory scheme plus the full complement of broker-dealer regulations, which include comprehensive requirements on net capital, supervisory controls, and reporting. When the Commission adopted Regulation ATS, it sought to encourage the introduction

of new markets and at the same time ensure investor protection.[1] ATSs had operated in the market prior to the 1998 rulemaking, but they were not fully integrated into the national market system. This lack of integration raised concerns about gaps in market access and fairness, systems capacity, transparency, and surveillance. The net result of Regulation ATS has been the growth of trading venues that offer varying business models and compete for order flow to the benefit of investors.

In the mid-1990's, at the same time it was examining ATSs, the Commission started examining the impact of fractions as pricing increments for securities. Today, of course, the minimum pricing increment for equities is one penny. Yet for nearly 200-years, equities traded in increments of 1/8th of a dollar. In 1994 the SEC published a report regarding the equities markets, in which it expressed concern with pricing in 1/8th of a dollar, or 12 ½ cents. Trading in "eighths" was causing artificially wide spreads and hindering quote competition.[2] Subsequently, the SEC and the exchanges changed the pricing increment to 1/16th of a dollar, or 6 ¼ cents, believing that this reduction would provide multiple benefits, including better pricing and enhanced liquidity. Several years later, Congress introduced legislation to direct the Commission to adopt decimal pricing for all equity securities. In response, the Commission mandated in 2000 that the exchanges implement decimal pricing by April 2001.[3]

In 2004, the Commission began a process of evaluating market structure that included public hearings and culminated in the proposal of Regulation NMS. The Commission adopted Regulation NMS in April 2005, stating that it sought to modernize and strengthen the regulatory structure of the equities markets. Regulation NMS was predicated on the need to foster more efficient markets by promoting fair competition among individual markets, while at the same time assuring that the markets were linked together to encourage the interaction of – and competition between – the orders of buyers and sellers.

The centerpiece of Regulation NMS is Rule 611, the Order Protection Rule (OPR), which provides intermarket price protection to "protected quotations." In conjunction with the OPR, Rule 610 addresses fair access, access fees, and locked and crossed markets. Reg. NMS also implements Rule 612, the Sub-Penny Rule, to address concerns related to the practice of "stepping ahead" of displayed limit orders by trivial amounts. In addition, the SEC revised the market data revenue allocation formula, and made changes to the governance structure of the consolidated market data Plans by establishing non-voting Advisory Committees.

These key provisions of Reg NMS were in response to specific policy goals that the Commission wanted to achieve. Specifically, the OPR sought to address market inefficiencies by further automating the markets and providing strong intermarket price protection in order to promote the display of limit orders, as well as to assure that those investors who submit market orders receive the best price available. Further, in adopting Rule 610, the Commission recognized the importance of interlinking in a manner that provided market participants with the ability to efficiently and fairly access a trading center's protected quotations. Additionally, by revising the

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[1] *See* https://www.gpo.gov/fdsys/pkg/FR-1998-12-22/pdf/98-33299.pdf
[2] *See* https://www.sec.gov/news/studies/2012/decimalization-072012.pdf
[3] *See* Commission Notice: Decimals Implementation Plan for the Equities and Options Markets (July 24, 2000), available at http://www.sec.gov/rules/other/decimalp.htm.

market data revenue allocation formulas and increasing NMS Plan transparency, the Commission sought to preserve the integrity and affordability of consolidated market data.

In the midst of these regulatory changes, and in light of competitive pressures from ATSs, the markets underwent an additional shift. In the early to mid-2000's, the national securities exchanges began to demutualize and become for-profit companies instead of member-owned utilities.[4] Today the largest exchanges are owned by publicly-traded corporations. As such, the exchanges are no longer expected to provide trading services to their members, but instead they have an obligation to deliver profits to their corporate shareholders.

Current State of U.S. Equities Markets

The net result of these changes, both regulatory and technological, is that today's market is certainly much different than it was in 1975 and is even unrecognizable from the market of 10 years ago when Regulation NMS went into effect. For the most part, these changes have been positive for investors and market participants. The markets today are highly automated and efficient, providing near instantaneous, low-cost executions. Additionally, the market is incredibly competitive and dynamic, which, in turn, has provided market participants with a diverse range of venues to place and execute their orders. Individual investors in particular have benefited substantially from the evolution of the markets.

Yet, amidst this evolution, there are aspects of our market structure that could be improved. For more than a decade, SIFMA has been a leading voice on equity markets analysis, and today we see at least five areas of focus for market structure and the future of Regulation NMS:

Order Protection Rule. With the OPR having now been in effect more than a decade, this is an ideal time for the SEC to conduct an analysis of its impact on the equity markets and whether it should be refined to address market evolution. To address market fragmentation and complexity, the Commission should evaluate the OPR and consider whether modifications or exemptions are needed, potentially including a volume threshold for protected quotation status and a block exemption for orders of significant size. The Commission also could consider an elimination of the OPR coupled with enhanced best execution principles, maintaining the status quo or enhancing price protection by protecting multiple levels of liquidity. In any of these cases, the markets would benefit greatly from a result based on analysis using current market conditions.

Access Fees. Since Reg NMS was adopted, spreads have narrowed and commissions have decreased, making the existing cap of access fees outsized relative to today's market realities. To address this, the Commission again has several different paths for possible reform: (1) reducing the access fee cap to no more than $0.0005 for all securities; (2) implementing the Commission's Equity Market Structure Advisory Committee's access fee pilot recommendation; or (3) eliminating rebates and linkages between passive posting of limit orders and transaction pricing. In any of these cases, the resulting access fee and rebate regimes would reflect an updated analysis based on the impact of current market practices.

Market Data. To assure that market data is timely, comprehensive, nondiscriminatory, and accessible to all market participants at a reasonable cost, the Commission should consider: (1)

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[4] *See e.g.* https://www.sec.gov/rules/sro/nyse/34-53382.pdf

enhancing the SIP feeds with bid and offer quotes beyond the top of book data and providing that as the sole source of consolidated market data to meet regulatory obligations; and (2) replacing the single-consolidator SIP model of market data dissemination with a competitive construct, such as a Competing Market Data Aggregators model. These results would improve the ability of all market participants to use SIP data for the benefit of investors and decrease the need for market participants to rely on the exchanges' increasingly unaffordable proprietary market data products.

NMS Plan Governance. To address conflicts of interests and enhance the NMS Plans, the Commission should provide broker-dealers and asset managers with meaningful direct voting representation on the NMS Plan Operating Committees. Including industry expertise in the direct governance of NMS Plans would enhance the operation of these important utilities and help to ensure they are operated for the benefit of the entire market, not just the commercial interest of the exchanges.

SRO Status. SIFMA supports effective regulation of the securities markets, and we believe that, properly structured, strong self-regulation must continue to be an integral part of the oversight of the market and its participants. However, the current self-regulatory structure is outdated and in great need of rethought and reform. In this context, SIFMA believes that Congress and the SEC should consider whether exchanges should continue to be subject to the full responsibilities and obligations of being SROs, or enjoy the protections and benefits that flow from that status. An overhaul of the self-regulatory model would address the significant conflicts of interest in having one group of for-profit commercial entities – the exchanges – act as regulators of the commercial competitors – broker-dealers.

While we understand and appreciate that the Committee intends to evaluate policy solutions at a later date, we would like to highlight two issues that are relevant to today's topic and are examples of where market evolution has created inefficiencies or worse: market data and NMS Plan governance.

With demutualization, exchanges that were once operating as public utilities are now for-profit entities with a legal fiduciary duty to maximize profit to shareholders. Yet exchanges still are Self-Regulatory Organizations (SROs), with the authority to regulate their own markets, and the securities markets in general. This has resulted in significant conflicts of interest, as for-profit companies now act as regulators of the very market participants that they directly compete with.

Further, with the exchanges acting as SROs, they also retain the ability to set market policy through NMS Plans, a regulatory device that the SEC has leveraged frequently in recent years in lieu of formal rulemaking. However well-intentioned, the NMS Plan structure has resulted in policies that are designed to benefit the exchanges' business interests or mitigate their regulatory obligations at the expense of broker-dealers. This outcome is largely due to the lack of direct representation by the industry (both broker-dealers and asset managers) on the Plan Operating Committees that are tasked with setting market policy.

Market data is at the core of equity market structure and Regulation NMS. Broker-dealers today are required to report their bids and offers and last sales for securities to SROs, which in turn are required to participate in a NMS Plan for consolidating and distributing that data. When Regulation NMS was adopted, the SEC acknowledged that one of its most important responsibilities was to preserve the integrity and affordability of the consolidated data stream. Additionally, the SEC

stated that one of the strengths of the current consolidated market data model was that it benefited investors, particularly retail investors, by enabling them to assess the best market prices and evaluate best execution of their orders by obtaining data from a single, consolidated source that is highly reliable and comprehensive.

Unfortunately, the consolidated data feed today is not usable for any kind of sophisticated or competitive trading platforms. Rather than improving the underlying infrastructure of the Securities Information Processors (SIPs) responsible for distributing the consolidated market data and enhancing the associated content, the exchanges have largely focused on their own market data offerings at sharply escalating fees. These proprietary feeds are distributed directly through upgraded connections (rather than via the consolidated market data infrastructure) and contain much more detailed information about the exchanges' trading books, including depth of book information, thus providing substantially enhanced views of the market to any market professional.

Consequently, the lack of depth of book data in the SIP feeds and the general inferiority of the SIPs' infrastructure have rendered the SIPs' consolidated core data effectively useless for accurate price discovery. They are now used primarily for informational purposes, administrative messages and to provide stale (from the perspective of computerized trading) price information to individual investors who rely on the SIPs as their primary market data source.

Nevertheless, market participants continue to be required to consume market data consistent with their best execution and other regulatory obligations and trading objectives. As market data fees continue to increase, market participants are offered little competitive recourse. This evolution has not only resulted in costs that are squeezing smaller broker-dealers out of being able to offer competitive trading platforms, but is also resulting in a multi-tiered landscape where some market participants are receiving trading information before others. It remains unresolved whether competitive forces alone can actually set a fair and reasonable price for market data.

Conclusion

The U.S. equity markets are dramatically different than they were just a few years ago. As we have for decades, SIFMA and its members are dedicated to engaging in the public debate over the health and fairness of our equity markets. We appreciate the interest of this Committee in evaluating the state of our markets and look forward to working with you in the coming months and years on this important task.

Written Testimony of John Comerford, Managing Director, Head of Global Trading Research, Instinet, Inc

before the U.S. House of Representatives

Committee on Financial Services

Subcommittee on Capital Markets, Securities, and Investment

Hearing entitled "U.S. Equity Market Structure Part I: A Review of the Evolution of Today's Equity Market Structure and How We Got Here"

Tuesday, June 27, 2017

Chairman Huizenga, Ranking Member Maloney and members of the Subcommittee.

Instinet appreciates the invitation to participate in this important hearing. We believe that Instinet, an agency broker founded in 1969, can bring a unique perspective to this process. For nearly 50 years, Instinet has provided institutional investors with electronic agency trading services and technologies - services including the first electronic trading platform, the first U.S. crossing network and some of the market's earliest examples of direct market access, smart order routing and algorithmic trading strategies. Instinet has also been a leader in offering robust transparency to its clients with some of the first transaction cost reporting and analysis tools in the industry. At its core, Instinet has been guided for nearly half a century, by one primary goal - providing best execution to its customers.

Throughout the history of stock trading, the push and pull of regulation and technology has driven the evolution of markets and market structure. Regulators push for level playing fields, and participants leverage technology to best compete within the regulatory framework. Regulation has also driven innovation. For instance Regulation Alternative Trading Systems (ATS) has both strengthened the public markets and also facilitated innovative trading models, providing a path for some of those models to become national securities exchanges. Representatives from some of those success stories share this panel with me.

Specifically looking back at over 10 years of Regulation National Market System (NMS), I believe we can unequivocally say that it has been successful in its goals of enhancing the efficiency of the market and supporting fair and vigorous competition. However, that doesn't mean that we should or plan to rest on our laurels. For instance, we applaud the proposals to further improve transparency by enhancing Rules 605 and 606. I believe there are additional steps we could take that would simultaneously reduce some of the unintended complexity and more actively encourage the display of limit orders.

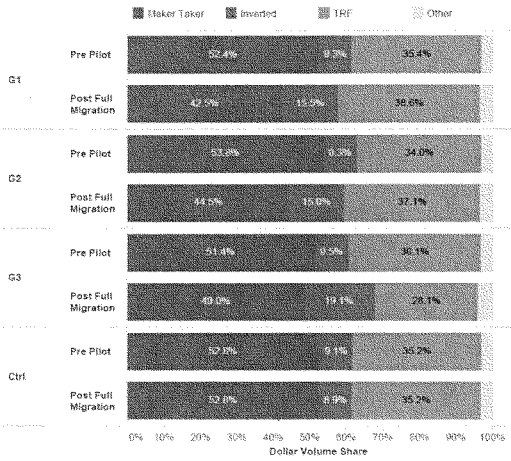
Others on the panel will likely cover the regulatory path to NMS and share their insights into Rules 605, 606, 610 and 611. I'd like to discuss a less discussed, but no less critical component of Regulation NMS, namely Rule 612, the Sub-Penny rule.

The minimum pricing increment of US equities began its decline in 1997, dropping from ⅛ of a dollar to teenies, or 1/16 of a dollar, mostly driven by competition from the Electronic Communication Networks (ECNs). That move was quickly followed in 2001 by full decimalization. It is worthy to note that it was decimalization more than Regulation NMS that drove average spreads down to the levels we currently experience. Regulation NMS set a floor on tick size compression with Rule 612, setting the minimum pricing increment for both quotes and orders to a penny for all stocks trading over a dollar.

At the time, a penny seemed more than reasonable - not too big, not too small. However, we now better understand that our one size fits all tick size engenders unnecessarily disorderly

trading behavior by creating unbalanced incentives between market participants for many stocks.

For instance, capturing a penny spread on a lower priced, more active stock is quite attractive for a liquidity provider. For these names, we see extreme competition at the public bid/offer, leading to quote fragmentation and volume being pushed towards dark pools and inverted destinations. Some early results from the Tick Size Pilot demonstrate the effects of widening tick sizes. Notice Groups 1 and 2 below where liquidity has shifted significantly from the maker-taker pools towards the inverted pools and Trade Reporting Facilities (TRF).

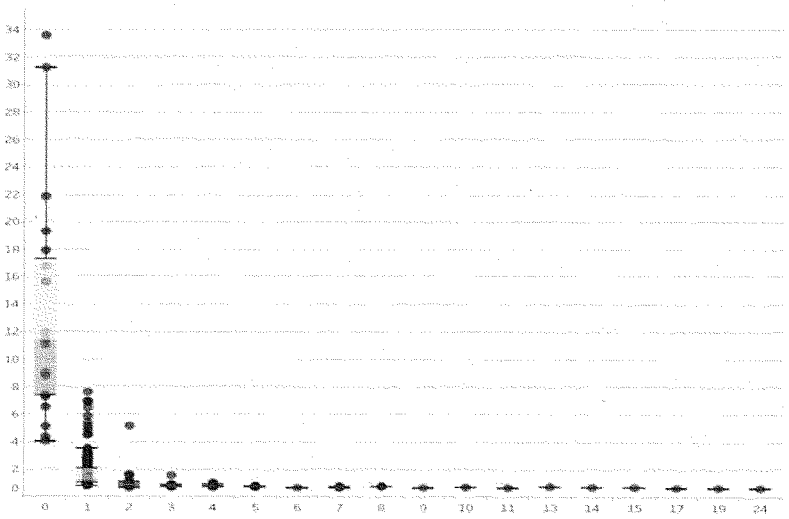


		Pre Pilot	Post Full Migration	%Change
G1	Maker Taker	52.4%	42.5%	-9.9%
	Inverted	9.3%	15.5%	6.2%
	TRF	35.4%	38.6%	3.2%
	Other	2.9%	3.4%	0.5%
G2	Maker Taker	53.8%	44.5%	-9.3%
	Inverted	9.3%	15.0%	5.7%
	TRF	34.0%	37.1%	3.2%
	Other	2.9%	3.3%	0.4%
G3	Maker Taker	51.4%	49.0%	-2.4%
	Inverted	9.5%	19.1%	9.6%
	TRF	36.1%	28.1%	-8.1%
	Other	3.0%	3.9%	0.9%
Ctrl	Maker Taker	52.8%	52.8%	0.0%
	Inverted	9.1%	8.9%	-0.2%
	TRF	35.2%	35.2%	0.0%
	Other	3.0%	3.1%	0.2%

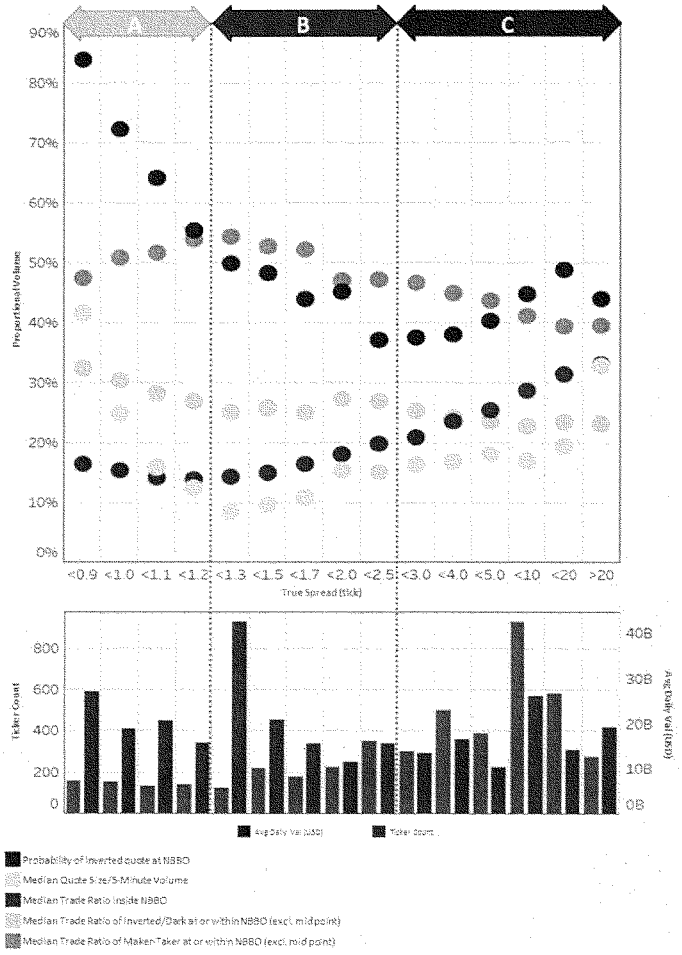
As much of the recent market structure dialogue revolves around the distortions created by the extreme competition in these larger percentage tick size names, it is somewhat forgotten that Rule 612 was designed to ensure that tick sizes did not get too small. The rule was intended "to promote greater price transparency and consistency, as well as to protect displayed limit orders" and address "the practice of 'stepping ahead' of displayed limit orders by trivial amounts." We now know that, for higher priced and lower liquidity names, one penny is not a large enough minimum price increment to support these goals.

Consider the following chart. This is a histogram of the top 350 US stocks by average traded value displaying the ratio of their effective spread to their tick size. The x-axis is a penny tick size in basis points. For stocks with tick sizes greater than 5 bps, that is stocks trading under $20, the effective spread was materially the same as their tick size. In other words, the spread is

constrained by the tick size. When the tick size drops to 2 bps ($50 stocks) the average effective spread increases to about 1.5x the tick size. But for stocks under 1 bps, stocks over $100, the effective spread of the stock averages 12 times the tick size. These are large volume stocks, like GOOGL and AZO. For these names Rule 612 and the penny increment are not encouraging the display of limit orders.



So, how pervasive are these issues? At Instinet, we consider only ⅓ of all U.S. stocks to have a "right-sized" minimum price increment, in which the costs and incentives of liquidity providers and liquidity takers are balanced. The following diagram illustrates some of our findings. Group A contains "tick constrained" names, where the true spread (defined as the average quoted spread including all exchange fees and rebates) is less than 1.2 cents. Group B contains the moderately constrained names, where the true spread is less than 2.5 cents. Group C contains the unconstrained names where the average spread is greater than 2.5 cents wide. Each group represents about 30% of the US stock market.



In Group A, one can see that:

- inverted pools, represented by red circles, become an important part of the NBBO
- the quote size relative to volume, represented by yellow circles, increases
- the volume, ex mid-point, in inverted and dark pools, represented by light blue circles, increases

In Group B, representing the stocks with a "right-sized" price increment, one can see that:

- stocks don't exhibit the extreme fragmentation and fierce competition at the NBBO seen in Group A
- the tick size is still wide enough to attract liquidity providers to display limit orders

In Group C, where the tick size is small relative to the spread, one can see the effects that Rule 612 was designed to address:

- traditional maker-taker exchange volume at the touch, represented by gray circles, decreases
- there is a material increase in volume traded inside the spread, represented by the dark blue circles
- as we saw in the previous diagram, this behavior is not constrained to illiquid stocks

Regulation NMS redefined equity trading and strengthened the leading position of our equity markets globally. The foresight of the regulators and commenters a decade ago should be applauded. Any regulatory or statutory changes would be well served to retain the primary principle behind the design of Regulation NMS, namely promoting fair competition among markets and orders.

Finally, I would like to note that, while I focused on Rule 612, market structure issues are complex and interrelated. Any potential changes, whether tick sizes or access fees or order protection are best considered holistically and comprehensively, rather than independently. Everyone in this room shares the same goal - healthy secondary markets. We at Instinet thank you again for the opportunity to share our thoughts and opinions.

I look forward to answering any questions you might have.

Testimony of Chris Concannon

President and Chief Operating Officer

CBOE Holdings, Inc.

Before the Subcommittee on Capital Markets, Securities, and Investment

Tuesday, June 27, 2017

Mr. Chairman and members of the Subcommittee, I am Chris Concannon, President and Chief Operating Officer of CBOE Holdings, Inc. ("CBOE"). I have over 20 years of experience as an exchange executive, trading firm executive, and a regulator. I served as CEO of Bats Global Markets, Inc. prior to its combination with CBOE earlier this year. I would like to thank the Subcommittee for inviting me to testify today. I also commend the Subcommittee for its ongoing review of complex and critical issues that exist within the U.S. equity markets, including Regulation NMS.

CBOE is one of the world's largest exchange holding companies. We are a leader in providing global investors with cutting-edge trading and investment solutions. CBOE operates six national securities exchanges consisting of four options markets, including the largest U.S. options exchange, and four equity markets, comprising the second-largest U.S. stock exchange operator. CBOE also operates a futures exchange, the largest European exchange and a foreign exchange platform. We have offices around the world and have established ourselves as a global exchange leader and innovator, working collaboratively with our market participants to introduce new products, indices, and services to meet the evolving needs of the stock and derivatives industry. We offer the industry's widest array of products, including options, futures, equities, ETFs, FX and proprietary index products such as S&P 500 options ("SPX") and futures and options on the CBOE Volatility Index ("VIX"). We also operate a leading proprietary technology platform

designed to optimize reliability, speed, and versatility across our markets. Additionally, CBOE continues to be a leader in investor education through its Options Institute, ETF.com, and other CBOE-sponsored financial educational programs.

In 1975, Congress amended the Securities Exchange Act of 1934 (the "Act") to facilitate the establishment of a national market system to link together the multiple individual markets that traded securities. Congress designed our national market system to achieve the objectives of efficient, competitive, fair, and orderly markets that are in the public interest and protect investors. Congress intended for the Securities and Exchange Commission ("SEC" or "Commission") to take advantage of opportunities created by advancements in technology to preserve and strengthen the securities markets. In response to this congressional mandate, the SEC has adopted various rules since 1975 to further the objectives of the national market system, including the order handling rules in 1997, Regulation ATS in 1998, decimalization in 2000, and, importantly, Regulation NMS in 2005.

The primary purpose of Regulation NMS was to modernize and increase the efficiency of the equity markets by establishing various rules, including rules to create an interlinked and automated market to ensure investors receive the best price available, ensure fair access, and promote competition. Our national market system is premised on promoting fair competition among individual markets, while at the same time ensuring these markets are linked together to promote interaction among the orders of buyers and sellers. This system helps foster competition among individual markets, which can promote more efficient and innovative trading services, and among individual orders, which creates more efficient pricing of stock orders of all types and sizes. This competition produces markets that offer benefits to both investors and listed companies.

The implementation of Regulation NMS has contributed positive results to the markets, including tighter spreads, efficiency, the ability to handle increasing volume and message traffic, and competition. Overall costs to investors in the U.S. equity marketplace have fallen and are among the lowest in the world, and market quality and reliability continue to improve. Retail customers now have low-cost, immediate access to our markets with exceptional execution quality.

However, Regulation NMS has also contributed to some unintended consequences throughout the marketplace. Regulation NMS has created a complex and fragmented market, which may increase costs for some market participants. While order protection is beneficial to displayed limit orders, the existence of order protection provides new or relatively small exchanges with a commercial advantage despite not having to demonstrate to investors their value to the marketplace. Any competitive benefits that may result from an additional exchange can be offset by the increased costs and complexity relating to the required connectivity to an additional market. For example, CBOE operates six national securities exchanges today but we only run four equity markets. Regulation NMS provides commercial benefits for us to populate all six exchange medallions with equity markets; however, two additional equity exchanges may not necessarily provide a benefit to market liquidity or price formation. The US equity market currently supports 12 equity exchanges and over 40 SEC-registered dark pools. I assure you that was not what Congress anticipated in 1975.

Now, complexity and fragmentation is not itself a problem. Our market quality for retail orders clearly reflects that we have professionally solved for these two challenges. However, certain orders and certain market participants experience serious challenges as a result of this fragmentation and complexity and improvements are warranted. The handling of large orders for institutional customers has clearly suffered over the last ten years. While spreads have narrowed,

there is less displayed liquidity to satisfy large orders. The current landscape reflects greater market impact as these large orders enter the market. And as a result, those large orders take longer to get executed while they attempt to find liquidity. This large order size problem affects our nation's largest asset managers and owners, including the largest pension and mutual fund companies who manage the average household portfolio and retirement savings. However, the challenges that large orders experience in today's market are not in every symbol across the U.S. equity market. Those challenges are typically not experienced in our more liquid stocks, which include large cap names and exchange traded funds.

These experiences point to a critical flaw of Regulation NMS. I believe Regulation NMS was materially flawed in its "one-size-fits-all" approach to our markets. Under Regulation NMS, all stocks are treated similarly regardless of market cap, liquidity or public float. Our current market rules do not care if a stock trades once a month or 1 million times per day. Our market rules do not care if a company is valued at $800 billion or $25 million. This is not an ideal design for the largest, most diverse equity market on the planet.

Given these flaws and the challenges that Regulation NMS has created in our equity markets, I encourage this Subcommittee and the Commission to undertake a comprehensive review of Regulation NMS to identify potential changes that continue to promote the objectives of Congress while modernizing Regulation NMS to address some of these unintended consequences and significant changes to the marketplace since its implementation in 2007. New market functionality, increased speed in the market, and new and innovative products designed to address the needs of diverse market participants, have all contributed to the need for a comprehensive review of Regulation NMS. Regulation is important for a fair and efficient marketplace, but it must be nimble enough to address the constantly changing economic, operational and regulatory

needs of all market participants. Any proposed regulatory reforms must consider the potential benefits those reforms may have on the market, as well as any costs and potential unintended consequences that may make such reforms counterproductive.

As part of a comprehensive review of Regulation NMS, we urge the Subcommittee and the Commission to consider the appropriateness of the one-size-fits-all approach of Regulation NMS. Further, structural solutions should take into account the differences between equity products and their characteristics. For example, trading in highly-liquid stocks, ETFs, less-liquid stocks, and high-priced stocks may all require different structural features to optimize effective trading for investors.

In addition to increased flexibility or varying rules under Regulation NMS to account for different types of securities, we also believe that other aspects of Regulation NMS warrant reconsideration. Those include the perhaps outdated access fee cap that limits exchange transaction pricing despite the fact that Congress intended competition to constrain transaction fees. A comprehensive review of Regulation NMS should attempt to understand how the current access fee model may impact trading patterns while simultaneously and carefully examining other related factors. Certainly, the prohibition on locked and crossed markets in Regulation NMS is also worth revisiting. And finally, we suggest consideration of a market structure that would only protect quotes displayed by exchanges that meet a minimum market share threshold, which is similar to the way the Canadian market operates.

I also recommend that the Subcommittee urge the Commission to study the recent phenomenon of what I call ultra-high-priced stocks and their impact on investors and market structure. Currently, over 13% of the overall market capitalization of U.S. corporate securities is comprised of securities that trade above $200, including well-known names like Amazon and

Alphabet, owner of Google, each currently trading around $1,000 per share. Prior to the financial crisis, companies regularly split their stock to target a price per share of below $100. This was traditionally done to encourage retail participation and ensure liquidity in secondary markets. The recent phenomenon of not splitting stock is having a substantial impact on retail investors and impacting liquidity in the secondary markets. We recently examined retail orders on one of our equity markets and concluded that retail investors are paying 10 times more in spread for stocks priced above $100 than they are paying for lower priced stocks. We have also concluded that high-priced stocks are experiencing lower volumes, both in terms of share volumes and notional volumes by retail traders. This materially impacts liquidity for large investors, creating additional challenges to trade these stocks. Finally, we compared the market cap growths of ultra-high-priced stocks (defined as those with a price greater than $200) near the start of the bull-run in 2010 to the prices of ultra-high-priced stocks in 2017. The market caps of those ultra-high-priced stocks increased a remarkable 400% compared to approximately 68% for those under $200. With waning retail interest in these names, it raises the question whether many investors are being denied the enjoyment of this growth due to a market under servicing pricier stocks.

Only the Commission can conduct a study of this nature because a study by exchanges or brokers will be questioned due to our dependence on revenue by share volume. The impact on investors both large and small from the recent phenomenon of ultra-high-priced stocks is certainly worthy of serious analysis by the SEC.

While our current equity market structure has its flaws, I believe the U.S. equity markets continue to be the most efficient and liquid markets in the world. I encourage any proposed reforms to carefully consider the impact on all market participants and the potential unintended consequences on the market. We fully support a truly comprehensive review of Regulation NMS

and any reforms that may improve the quality of our overall markets. CBOE stands ready to work with all interested parties on reviewing market structure as we believe we are uniquely positioned to offer a perspective that reflects trading in many asset-classes. Thank you for the opportunity to appear before you today, and I am happy to answer any questions you may have.

TESTIMONY OF NEW YORK STOCK EXCHANGE PRESIDENT THOMAS W. FARLEY
BEFORE THE
U.S. HOUSE OF REPRESENTATIVES COMMITTEE ON FINANCIAL SERVICES
CAPITAL MARKETS, SECURITIES, AND INVESTMENT SUBCOMMITTEE ON
U.S. EQUITY MARKET STRUCTURE PART I: A REVIEW OF THE EVOLUTION OF TODAY'S
EQUITY MARKET STRUCTURE AND HOW WE GOT HERE
JUNE 27, 2017

Chairman Huizenga, Ranking Member Maloney and members of the Subcommittee, we appreciate your interest in the evolution of the U.S. capital markets. My name is Tom Farley and I am President of the New York Stock Exchange (NYSE). Last month, we celebrated the 225th anniversary of the morning when a group of 24 enterprising entrepreneurs inspired by Alexander Hamilton's vision met underneath a buttonwood tree outside 68 Wall Street in lower Manhattan to sign an agreement that would create the New York Stock & Exchange Board and formalize the burgeoning capital markets of the United States. The first stocks and bonds traded on the new exchange included The Bank of New York, which Hamilton founded and is still listed and traded on the NYSE.

Today, the New York Stock Exchange is the world's largest with total listed company market capitalization of $30 trillion representing nearly 40% of the world's total market value. The U.S. capital markets are the destination of choice for investors and companies as they provide unparalleled access to capital, liquidity, and trusted regulation.

The NYSE's core mission has never wavered: we help men and women raise money for their companies so they can build, innovate, discover and grow. In doing so, they spur economic growth by investing and innovating, leading to a higher quality of life for Americans and global citizens. NYSE-listed companies employ 40 million people around the world. From this job creation, to providing funding for technology and medical R&D or industrial investment, to establishing 401(k) plans and programs to give back to their communities -- all of this raises up the citizens of our country and the world.

Our Markets Primary Purpose is to Serve the Needs of Issuers and Investors

Our markets are the strongest in the world and the U.S. continues to lead in capital raised by newly public companies through an IPO. We cannot, however, assume that this will always be the case. Regulations intended to strengthen our markets are in some ways weakening them. One consequence is that the number of exchange-listed companies is half of what it was 20 years ago. In addition, the average market capitalization of exchange-listed companies is six times greater than it was 20 years ago. This means individual and small institutional investors who invest through the public markets are limited in their choices. Also, if smaller, high-growth companies decide to delay accessing the public markets until after they are mature, those same investors will miss benefiting from their significant growth years. It is easy to write off securities regulation as an issue that only impacts Wall Street, but it also meaningfully impacts Main Street.

For the many benefits of being a public company, there are many negatives, including an increasingly complex, fragmented, and opaque secondary market structure for investors and market participants who wish to buy and sell these public companies' securities. Our markets have changed significantly over the past 10 years since the adoption of Regulation NMS. Equity markets are now intensely competitive and innovative. Unfortunately, these positive attributes have also brought with them added challenges of increased fragmentation, lack of obligated liquidity provision, and a decrease in displayed liquidity, particularly in less liquid stocks. We need smarter regulation to address these issues, which are important to both issuers and investors, and NYSE supports the Subcommittee's efforts to take a detailed look at U.S. equity market structure.

Fostering market quality for listed companies and investors is paramount when considering potential changes to the U.S. equity market structure. NYSE is the global leader in market quality, providing stable, displayed quotes with meaningful size and a narrow bid-ask spread. Our market models are constructed to create the right balance between market maker benefits and obligations. The Designated Market Makers on NYSE have more significant obligations than any other class of market maker in U.S. equities. They guarantee all marketable interest will be satisfied in opening and closing auctions, they must contribute to the best quotes in the market a certain percentage of the trading day, and must also provide liquidity at multiple price points to dampen price moves throughout the day. Unlike most market maker incentive programs, these are not voluntary obligations they can ignore when market conditions are less

appealing but rather rule-based mandatory obligations that carry regulatory risk. In exchange for those accepting that risk, they are rewarded with a set of incentives, including increased participation opportunities and favorable transaction fee pricing. We invest quite literally, in better market quality for our issuers.

Regulations Should Foster Displayed Liquidity on Which All Market Participants Rely

The NYSE believes that regulation needs to be better designed to protect and reward displayed liquidity, and that any changes to equity market structure should emphasize increased transparency to listed companies and investors. The years following the adoption of Regulation NMS have seen a proliferation of trading venues, including both exchanges and non-exchange venues such as dark pools and broker-dealer internalization engines. Off-exchange trading in the U.S. equity markets for the month of May 2017 was 37.6% of Consolidated Average Daily Volume.[1] Dark pools were originally intended to be venues for large trades but they have become an avenue for skirting regulation and subverting displayed markets. The NYSE believes it is critical for the markets to recognize that these dark venues rely on the public, transparent prices of securities that are provided by exchanges and do not themselves contribute anything positive to price discovery.

In other words, our markets simply do not work without the market participants that publicly display the prices and sizes of trading interest at which they are willing to trade, and without a high-quality public quote, the prices investors receive on their trades in these dark venues will be impaired. Because the quality of public securities quotations is directly related to the proportion of trading interest that contributes to these quotes, the NYSE is concerned that the aggregate effect of dark or internalized activity will continue to degrade the public price discovery process and potentially harm an otherwise healthy public market. This impact will also have detrimental downstream effects on the attractiveness of public markets to listed companies.

A Less Complex Market Structure Would Serve Issuers and Investors

The theme "simplicity" should drive discussion of any changes to equity market structure. While the word "innovation" is a tempting justification for changes designed to give a competitive advantage, many "innovations" in recent years include structures and practices that add

[1] Source: NYSE

needless complexity to an already overly-complex market structure. In hindsight, there are many "innovations" from the past 10 years in the financial markets that have had dramatic unintended consequences and should have been handled differently.

We hear concern from NYSE listed companies and investors regarding increasing complexity and fragmentation in the U.S. equity markets, and the resulting challenge in finding sufficient liquidity. These worries are particularly acute for listed companies with lower market capitalizations and lower levels of trading activity, and for large investors looking to buy or sell sizable positions. One vital counterpoint to this liquidity challenge is the end-of-day closing auction, where a single process aggregates all buying and selling interest in a stock to determine the official closing price. The closing auction accounts for an average of 6% of an NYSE listed company's total daily trading volume. The transparency of the auction process allows investors of all types to participate with the assurance of a fair and accessible price. A recent proposal to the SEC, cloaked in the spirit of "innovation," would further fragment today's closing auction process. This proposal would increase complexity in our markets, a development which generally favors professional traders at the expense of long-term investors, and could negatively impact the substantial liquidity currently available to all market participants in the closing auction.

SEC Rulemaking Should be Transparent

The tools for regulating the markets need a fresh look. For example, as envisioned by Congress in the Exchange Act Amendments of 1975[2], the U.S. Securities and Exchange Commission ("SEC" or "Commission") relies on self-regulatory organizations ("SROs"), including exchanges, to design and operate national market system plans ("NMS plans"). When the Commission, by rule or order, requires SROs to develop NMS plans, the SROs must act consistent with their SRO obligations, including compliance with SEC orders pertaining to topics, timelines and boundaries of such NMS plans. As a result, SROs must deliver NMS Plans to the SEC in the timeframe specified and within the guidelines required by the Commission's order or be subject to a potential enforcement action by the Commission.

The Commission has increasingly outsourced its policymaking to the self-regulatory organizations by relying on NMS plans rather than the direct SEC rulemaking process to

[2] Pub. L. No. 94-29, 89 Stat. 97 (1975).

achieve the Commission's policy goals. In the 25 years between the enactment of the 1975 Act Amendments and the year 2000, only three NMS plans were approved by the Commission -- all related to the collection, consolidation and dissemination of the best bids and offers and transaction reports in cash equity securities and equity options. There are now *eleven* NMS plans. NYSE believes that the Commission should curtail this trend toward the use of NMS Plans to achieve its policy goals and instead directly conduct data-driven SEC rulemaking subject to robust economic analysis and public review and comment. In this regard, NYSE wholeheartedly supports Commissioner Piwowar's recent statement regarding the use of NMS plans for constructing an "Access Fee Pilot" as recommended by the SEC's Equity Market Structure Advisory Committee.[3] While the direct SEC rulemaking process is more labor-intensive to initiate than indirect rulemaking through NMS Plans, we agree that it is the appropriate approach for the SEC to initiate changes to the rules governing the U.S. equity markets.

Conclusion

Smarter regulation of today's equity market structure will ease the burden for entrepreneurs and innovators to access the capital markets and will allow the U.S. to extend its leadership in the global markets. National securities exchanges, such as the NYSE, serve a fundamental role in the national market system by providing listing venues for companies seeking to raise capital and transparent prices for investors and market participants wishing to buy and sell the securities of public companies. This year, NYSE celebrates the 225th year of its proud history in the U.S. capital markets. As the technological and competitive landscape evolves, NYSE will enhance its legacy by continuing to make significant investments in technology and exchange operations, developing new services, and maintaining robust market surveillance.

225 years ago, with George Washington as President, our great nation was well on the way to becoming the Land of Opportunity. All issuers and investors, large and small, should have access to the bounty of the capital markets. On behalf of the NYSE's listed companies and investors, we encourage right-sized regulation for our capital markets system.

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[3] Public statement available at: https://www.sec.gov/news/speech/piwowar-keynote-columbia-university-032317

We look forward to working with the Congress, the SEC and the new Administration to make sure America preserves its status as the world's home of innovation and free enterprise for the next 225 years and beyond. We thank the Subcommittee again for its interest in these matters.

Testimony of Investors Exchange Chief Executive Officer Bradley Katsuyama
Before the
U.S. House of Representatives Committee on Financial Services
Subcommittee on Capital Markets, Securities, and Investment
June 27, 2017

Introduction

Chairman Huizenga, Ranking Member Maloney and members of the Subcommittee, my name is Brad Katsuyama and I am the CEO of IEX Group, Inc. and Investors Exchange LLC, more commonly known as "IEX". I appreciate the opportunity to offer this testimony and also appreciate your willingness to provide a forum to consider ways to strengthen the U.S. equity markets.

The U.S. equity markets constitute a critical national asset. They provide a vital source of capital for companies, large and small, and they provide the chance for millions of ordinary Americans to help fund and participate in the benefits of economic growth. From my perspective, the question we should always consider is whether the markets are primarily focused on serving the interests of investors and public companies, and the value of any agenda items should be determined based on whether they advance or detract from this primary focus. If the equity markets are not adequately serving these constituents and advancing the principles of fairness, transparency, and trust, then action must be taken to re-focus the markets on these tenets.

Technology has been the largest driver of change in the equity markets over the past two decades, as I will detail later. As trading has become highly electronic, technology has delivered a variety of efficiencies and other advantages (i.e., automation, explicit cost reduction, increase in speed). But unlike the broad sweeping benefits of technological advances in other industries, in the equity markets these benefits have been narrowly distributed among a small group of insiders, with the result that the interests of short-term traders and exchanges have been

prioritized over public companies and long-term investors, who represent the savings and retirements of millions of Americans

Various practices by the national stock exchanges have contributed substantially to market unfairness and market complexity, and they have created and exacerbated conflicts of interest. The most significant and detrimental exchange-generated conflict involves the practice of paying rebates to brokers for orders. In simple terms, this payment to brokers when not shared with the broker's client is equivalent to a kickback. Public data shows that exchanges who pay this rebate garner a greater percentage of order flow despite providing worse execution quality. In short, rebate practices cause clear and significant harm to investors. In addition, they are inextricably linked to much complex regulation that, although designed to serve the interests of investors, has had unintended consequences and could be reduced or eliminated if this conflict is removed.

IEX came about as a free market solution to aspects of equity market evolution that left investors and public companies underserved. We began operating as an alternative trading system ("ATS") in 2013, and last year, we won the right to operate as a national securities exchange, based on broad support from investors and brokers but over the intense opposition of other exchanges and a small number of high-speed traders. As an exchange, we have continued to innovate in ways that prioritize the interests of investors, and pending regulatory approval from the SEC, we look forward to competing for corporate listings beginning later this year. IEX does not sell multiple tiers of technology and data and instead offers all members the same access, free of charge. IEX also does not pay exchange rebates to brokers and instead focuses on earning their orders by providing a higher quality execution.

Evolution of Technology

Exchanges have evolved over time from a manual, floor-based model to one that is fully electronic. This came about both because electronic communications technology was easily adapted to stock trading, and also because regulators made changes that (i) allowed electronic markets to compete effectively with traditional exchanges and (ii) promoted better market-wide price competition by mandating trading in decimals. With the adoption of Regulation NMS,

participants for the first time were prohibited from trading at a worse price than one available through an automated quotation posted on a registered exchange without first accessing the exchange quote.

Together, these developments made the speed of trading much more important than it had ever been, and gave rise to a new class of proprietary high-speed trading firms. By itself, that was not harmful. However, a critical turning point occurred when the national stock exchanges themselves became entrenched in selling high-speed data and technology, which greatly conflicted with their role as self-regulatory organizations with a mandate to maintain fair and orderly markets. In effect, their motivation for profits drove them to sell advantages on their own markets in a way that benefits the fastest traders at the expense of all other participants.

In our view, the proper role of an exchange is to act as a neutral referee, allowing buyers and sellers to compete on price and speed but ensuring that the interests of investors and public companies are protected. The role of the exchanges is to provide the fairest possible price to both sides of the trade. But in reality, exchanges today play almost an opposite role by selling different speeds of technology and data to allow those with a faster view of the market to trade with advanced information against those who have not paid for the same level of access. Ideally, exchanges should be seeking ways to level the playing field, whereas the large exchanges today are tilting it heavily against long-term investors.

Given the multiple tiers of exchange data and technology being sold, high speed trading firms have the ability to process market data in microseconds. What seems to any normal observer as an instantaneous market event, will therefore be seen by a high-speed trader as a very slow-moving series of events (considering that it takes approximately 300,000 microseconds to blink your eye), allowing the high speed trader to utilize information that is not yet received by other participants. As a result, there is a significant transfer of wealth in these brief moments of time. And the profits don't come from thin air—the equity markets are a zero-sum game and those profits are often extracted from the large institutional investors that represent the savings of individuals through pension funds, mutual funds, and 401(k) accounts.

As a result of technology and exchange practices, it is generally estimated that "high frequency trading" ("HFT") accounts for over 50% of trading volume. This term should not be confused with "quant trading or investing" which is the use of quantitative models to make investment decisions based on factors unique to a particular company or stock. The term HFT covers a broad range of activity, some beneficial and some harmful from an investor and issuer perspective. It includes electronic market making by firms that maintain quotes on both side of the market and seek to earn the "spread" between their bids and offers in return for supplying liquidity to other participants. It also includes predatory traders who seek to use systematic and structural advantages to see and react to market information before other participants. We believe this type of activity is harmful to the equity markets. Some firms engage in both market making and predatory activity, making it even harder to distinguish who is helping or hurting the market based on a firm's business model.

Evolution of Exchange Pricing and Rebates

Another major source of complexity and conflicts of interest involves the payment of exchange rebates under the "maker-taker" pricing system that the largest exchanges use to charge for trading.

The largest exchanges in the United States operated by Nasdaq, NYSE, and BATS, pay approximately $2.5 billion in rebates per year to brokers to send them orders. These payments are paid to brokers on a monthly basis, based on complex tiers devised by each exchange, primarily designed to attract more order flow. RBC Capital Markets conducted a study on exchange pricing, revealing that there were 856 different pricing tiers across the exchanges – mainly driven by the size of the rebate and who receives it. [1]

This system of pricing is complicated and difficult to explain, but in essence, just as every transaction has a buyer and a seller, every trade must also have what exchanges call a "maker"

[1] Nathaniel Popper, "Stock Exchange Prices Grow So Convoluted Even Traders Are Confused, Study Finds," New York Times, March 1, 2016, accessed January 7, 2017, http://www.nytimes.com/2016/03/02/business/dealbook/stock-exchange-prices-grow-so-convoluted-even-traders-are-confused-study-finds.html

and a "taker." In the most typical rebate structures, if the quote for a stock is $10.00 x $10.01, both the buyer bidding $10.00 and the seller offering at $10.01 are considered "makers" of liquidity and are paid a rebate for doing so. If a buyer decides to pay the offer price of $10.01 or a seller decides to sell at the bidding price of $10.00, that buyer or seller is said to "cross the spread" and is considered a "taker" of the liquidity created by the "maker." The "taker" of liquidity is charged a fee.

Two exchanges use a variant of this system (called "taker-maker"), where the rebate is paid to the broker that takes liquidity, while the party that makes liquidity pays a fee. The maximum take fee is set by SEC rule at 30 cents per hundred shares ("30 mils"), but there is no restriction on rebates. Island ECN, an early electronic competitor to the dominant exchanges, first introduced rebates in 1997 in order to incentivize quoting activity on that market. Ironically, at a time when maker-taker pricing has become the dominant pricing model in the US equity market, even the founder of maker-taker pricing himself has publicly suggested that the rebate model has outlived its original purpose.[2]

The maker-taker system has been widely recognized as creating an obvious and significant conflict of interest between brokers and their customers. In practice, we think that the rebate system has resulted in tangible harm in a variety of ways:

First, the maker-taker system has resulted in a proliferation of exchanges without the benefit of real competition. For example, the Bats "BZX" Exchange does not compete directly with the BYX, EDGX, or EDGA Exchanges since they are all owned by the same company. The same can be said for the multiple exchanges owned by NYSE Group and Nasdaq, Inc. This result is proven by the relatively stagnant market share among the three large exchange groups in recent years. In one respect, price competition within the rebate model is limited because of the SEC access fee cap – the limit of 30 mils indirectly also limits the maximum rebate an exchange can afford to pay. In effect, the three large exchange groups compete to protect and retain the

[2] *See* Summary of Equity Market Structure Roundtable Hosted by Rep. Scott Garrett, July 28, 2014, avail. at https://www.sifma.org/members/hearings.aspx?id=8589950185

advantage that they have gained, as a group and individually, rather than competing to provide better services or products for investors and brokers.

Second, the rebate payment causes longer lines to execute on maker-taker exchanges. Because exchanges almost always rank orders at the same price based on time priority, orders sent by high-speed trading firms with faster access to the exchanges are more likely to win the race to the front of the line, while orders representing mutual funds, pension funds, and other ordinary investors are more likely to be pushed further back in the line, thus having a lower execution priority. When an investor's order is relegated to the back of the queue, basic supply and demand principles would suggest that the order has a lower likelihood of being executed, or if the order does get executed, the price of the stock is more likely to move against the investor's order. Proof of this poor execution quality is demonstrated by an IEX white paper that used publicly available data to show that orders posted on the large rebate exchanges on average receive materially worse executions, based on post-trade price movements, i.e., immediately after the trade, prices tend to move against the interest of the participant whose order is posted.[3] Considering these price impacts, it is hard to see how a decision routinely to send customer orders to a high rebate exchange could square with brokers' best execution responsibilities.

Third, regulatory best execution guidance states that "likelihood of an execution" must be considered when choosing among venues.[4] The maker-taker exchanges have the longest displayed queues and also the largest market share. Specifically, because of the nature of maker-taker pricing, the exchanges that pay the highest rebates to orders that must wait in line to be executed, also consequently charge the highest fees to the counterparty who "takes" liquidity ("take fees"). Therefore, orders in line waiting to execute on a maker-taker exchange (which also charges high take fees) are less likely to be executed by a broker taking liquidity if a lower take-fee alternative exists at the same posted price. Thus, existing practices call into question whether exchanges are paying brokers to ignore best execution responsibilities.

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[3] *See* Elaine Wah, Stan Feldman, Francis Chung, Allison Bishop, and Daniel Aisen., A Comparison of Execution Quality across U.S. Stock Exchanges (April 19, 2017), available at SSRN: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2955297

[4] *See*, e.g., FINRA Regulatory Notice 15-46 (November 2016), at 4-5.

Said more simply, why would a reasonable person ever wait on the longest line, with the lowest likelihood of being serviced, for a worse outcome?

Fourth, because exchanges pay over $2.5 billion a year in rebates, these practices have had an increasingly distortive impact on decision making by both brokers and exchanges. In some instances, brokers seeking to maximize rebate payments from exchanges can earn more in rebates per share than the client is paying them in commissions per share (even though the client's execution quality will suffer greatly). Also, exchanges have a significant incentive to recoup the money that they pay in rebates by charging high take fees to remove liquidity, in addition to the fees they charge for market data, technology, and exchange access, as discussed below.

We strongly believe that the most effective step towards a more efficient, more transparent, and less conflicted U.S. equity market is the elimination of rebates, whether they are paid for posting orders or to take liquidity. We think that if rebates were eliminated, there is the potential to significantly reduce or eliminate regulation, including aspects of Regulation NMS, that is linked to the complexities that stem from these payments. Those who object that the rebate issue cannot be addressed unless a variety of other proposals, such as the highly controversial "trade at" concept, are adopted at the same time, are simply seeking to find reasons to preserve the status quo. There is nothing about the functioning of a healthy, competitive market that requires artificial inducements for people to trade.

The use of rebates amounts to a multi-billion-dollar conflict of interest between brokers and their investor clients, and for that reason a growing number of both investors and brokers are calling for its elimination. For example, a recent industry study found that only 5% of institutional investor traders were satisfied with the current maker-taker pricing system.[5]

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[5] *See* Pensions & Investments (January 9, 2017), avail. at http://www.pionline.com/article/20170109/PRINT/301099990/maker-taker-rebate-pilot-could-die-before-it-starts

Economists have long been concerned about rebate practices, and in fact two former SEC Chief Economists have stated that "in other contexts, these payments would be recognized as illegal kickbacks." One of these economists, Chester Spatt, who now sits on the SEC's Equity Market Structure Advisory Committee, has stated that the rebate problem has likely intensified as other revenue sources for brokers have shrunk, and that, "[p]resumably, many are acting in a self-interested fashion, and the self-interest leads to a lot of distortion."[6]

The Cost of Market Data and Exchange Access

The cost of market data and exchange access has been a cause of debate and concern for the industry for many years, and those concerns have grown as these costs have risen dramatically in the last several years. As described above, one factor driving these costs over time is the need for exchanges to earn revenue from sources other than trading (since rebate payments have cannibalized their trading revenues). Another factor is the increasing importance of speed to trading strategies. With the emergence of algorithmic trading and the increased role of HFT, both proprietary trading firms and large agency broker-dealers need to rely on high speed proprietary data, both because it can usually be delivered more quickly than the consolidated data disseminated by the securities information processors ("SIPs"), and because it gives a more complete view of each exchange's order book than SIP data. Exchanges also have been able to charge more for the data center connections through which participants receive this proprietary data, since they control access at the locations where the data is produced.

From our own experience as an exchange, we know that what exchanges charge for data bears no rational relationship to what it costs them to produce it. We also do not believe that the current fee levels are reflective of a truly competitive market, because there is no effective substitute for proprietary data for traders and brokerage firms that need to navigate the current market structure to be successful or serve their clients. In fact, it can be argued that brokers might be obligated in some cases to subscribe to proprietary data feeds in order to satisfy their best execution

[6] "Study Says Broker Rebates Cost Investors Billions", New York Times (May 6, 2012), avail at http://www.nytimes.com/2012/05/07/business/rebates-to-brokers-are-seen-as-a-conflict-of-interest.html

obligations to customers. Exchanges are required to file their fee increases with the SEC, but all of these filings are permitted to be made on an "immediately effective" basis that does not involve close scrutiny and does not require detailed justification by the filing exchange.

There is also a basic lack of transparency about exchange market data revenues. The available information consists only of what exchanges choose to disclose in their public company reports, but those provide only a limited view, which is not capable of comparison across markets. We believe it would be appropriate for the SEC to require disclosure of the amount of exchange revenue from the sale of market data products, borrowing from a proposal the SEC made in 2004[7] that seems more relevant and timely now, considering the increased importance of market data revenue to exchange profits over the last 13 years.

There also is no regular public information about revenues earned by exchanges from the sale of public SIP data. This points to a more general concern about the use of "self-regulatory" authority to serve the commercial interests of exchanges. As one example, the exchanges that control the relevant governing committees have an obvious conflict of interest between their role in disseminating and selling SIP data and their commercial interest in selling their proprietary data products, including products that are intended as faster and more detailed substitutes for SIP data. There is no effort to manage that conflict and no voting representation by brokers or investors. IEX has long favored voting representation by both sell-side and buy-side representatives on these committees.

Finally, the disparities across exchange market data products and access are numerous and growing, with each combination of products providing a relative advantage to those willing to pay the exchange more money. For example, simply buying "proprietary direct feeds" offers little relative advantage unless you are also willing to buy a 40GB cross connect (vs. a 10GB cross connect) and a wireless connection (vs. a fiber connection) – with each product choice being a few microseconds faster and, of course, more costly. This type of "product innovation" provides little to no value to the investment process, but allows the exchanges to generate additional profits by forcing certain members to constantly upgrade their services.

[7] Securities Exchange Act Release No. 50699 (November 18, 2004), 69 FR 71226, 71559 (December 8, 2004).

The Evolution of Alternative Trading Systems

Many brokers and long-term investors have turned to ATSs as a way to avoid the problems they encounter on the exchanges: high access fees, high and rising fees for data and technology, and relatively worse performance in terms of execution quality. The majority of ATS volume occurs on venues owned and operated by major banking entities, while a smaller proportion is represented by venues that lack this ready source of trading volume. Although ATSs first arose as a means for institutional investors to trade in larger size without the information leakage that often occurs on exchanges, today the average trade size on most ATSs is comparable to that of exchanges as they have sought to compete by attracting a more diverse group of participants, including HFT firms.

Unlike exchanges, ATSs do not have fair access requirements, do not publicly display quotations, are subject to much lower regulatory and compliance burdens, and have a relatively low cost of entry. As a result, there are now approximately 30 equity ATSs of various types in the United States.

IEX started trading in October 2013 as an ATS, and we believe that the ATS model provides an important trading alternative for market participants. At the same time, the lighter regulatory burden and lower cost to launch an ATS has spurred intense competition that in some cases has led to relaxed standards of conduct. Various SEC regulatory settlements during the last two years detail the ways in which some ATSs misrepresented their methods of operation or failed to comply with specific regulatory requirements.

In cases where large trading firms have an affiliated ATS, they have a natural incentive to direct customer orders to that venue, where the brokers' execution costs are lower, in preference to other venues. This can create a conflict of interest with best execution and other obligations to customers. Despite recent regulatory actions and fines, we see continued evidence that some brokers continue to direct orders to affiliated ATSs to an extent that appears to conflict with the objective of seeking the best outcome for customers.

The SEC proposed a set of disclosure and other requirements for ATSs in 2015, which would provide healthy additional transparency about their operations. Additional transparency of two types could also be helpful. First, disclosing the identity of particular ATSs on public transaction reports, on a delayed basis, could help the industry to better self-police the activities of these venues without the need for regulatory intervention. Second, disclosure of which ATSs are subject to Regulation SCI would give brokers and investors important information. Regulation SCI, which was enacted by the SEC following a series of high-profile technology outages, established new minimum standards intended to reduce the occurrence of trading systems issues, improve resiliency when systems problems do occur, and enhance the Commission's oversight and enforcement of these matters. Disclosure of which trading venues meet this important standard could be important to decisions by brokers and investors whether to send their orders to a particular ATS, particularly in light of recent heightened cyber-security concerns.

IEX is Changing the Narrative

IEX is above all a free market response to concerns by investors and other participants about speed advantages, conflicts of interest, rebate payments, and the cost of market data and access inherent in the existing exchange models. Our core mission is to place the interest of the intended beneficiaries of the markets – long-term investors and corporate issuers – front and center. That focus is reflected in our ownership and membership structure and has guided all the decisions we have made in designing our market:

- We created a "speed bump" to blunt the speed advantages that predatory traders can use to disadvantage the mutual funds, asset managers, and pension fiduciaries who trade for many millions of Americans every day.
- We have developed innovative products that protect investors from harmful effects of speed-based trading and asymmetry of market information.
- We adopted a flat fee system and do not pay rebates.
- We provide a uniform method of access to all of our participants, free of charge.
- We offer all of IEX market data and technology services for free and only charge members directly for their trading on IEX.

- We have made a conscious choice to grow our market by building a stronger foundation for the long term – higher quality executions and better service.

The main beneficiaries of the current structure fought fiercely to prevent us from being approved to operate as an exchange. Fortunately, the voices of investors and participants who support a more rational market structure carried more weight, and the SEC reaffirmed its commitment to free market innovation.

We are preparing to offer an alternative listing market beginning this Fall, pending regulatory approval, which will introduce long-overdue competition for corporate listings. We believe that corporate issuers have an equally important stake in markets that are simplified, transparent, and as free from conflicts as possible. Many of these public companies have lost faith in the markets due to a series of volatility events and auction mishaps, and because the presence of predatory trading strategies contributes to unnecessary volatility that undermines the quality of the market for their stocks and the trust of their stockholders.

Conclusion

Markets best perform their function to provide capital for growth and give the public an opportunity to participate in that growth when they prioritize the needs of long-term investors and public companies. As technology reshaped the trading market, many of the benefits of technology were siphoned away from the broader investing public and corralled by the stock exchanges and a select group of high speed traders for their own benefit. IEX was founded as a free market solution to counter these developments, and we are proud of the role we are playing in drawing attention to the conflicts that exist in the U.S. equity markets and offering long-term investors and public companies an alternative exchange that is firmly in their corner.

I look forward to the opportunity to discuss these issues with the Subcommittee.

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STATEMENT

OF

MATT LYONS
SENIOR VICE PRESIDENT AND GLOBAL TRADING MANAGER
THE CAPITAL GROUP

BEFORE THE

US HOUSE OF REPRESENTATIVES

COMMITTEE ON FINANCIAL SERVICES

SUBCOMMITTEE ON
CAPITAL MARKETS, SECURITIES AND INVESTMENT

ON

US EQUITY MARKET STRUCTURE: A REVIEW OF THE EVOLUTION OF TODAY'S EQUITY MARKET STRUCTURE AND HOW WE GOT HERE

JUNE 27, 2017

EXECUTIVE SUMMARY

- Congress passed the 1975 amendments to the Securities Exchange Act of 1934 (1975 Amendments) to authorize the SEC to create a national market system for equity securities and a system for nationwide clearing and settlement of securities transactions. The 1975 Amendments aimed to empower the SEC to strengthen the equity markets by linking together the various stock trading venues. The SEC has advanced the objectives of the 1975 Amendments through a variety of means, the most significant of which are Regulation NMS and a series of NMS plans. These regulatory actions in conjunction with technological developments have created a fast-paced, highly electronic market structure with a broad range of market participants pursuing a variety of trading and investment strategies.

- The US equity market is widely recognized as being the fairest, most efficient, and most competitive in the world. It allows companies to raise capital to create jobs, grow their business, and innovate by selling ownership stakes to investors. Although the market functions well, it has changed greatly since the SEC adopted Regulation NMS in 2005, and it is time to examine and improve equity market structure. We must, however, not lose sight of a key objective of Regulation NMS: serving the interests of long-term investors and listed companies.

- To best serve ordinary American investors, regulated funds call for reforms to minimize conflicts of interest and promote transparency in the equity market. Three current practices fall short of these key principles.

    - First is a prevalent fee model in the US equity market, known as "maker-taker," which pits broker-dealers' economic interests against those of their customers.

    - Second is the governance of NMS plans—plans that administer key aspects of the national market system but are controlled by entities with inherent conflicts of interest. The plans have a significant effect on a wide range of market participants, but self-regulatory exchanges (SROs)—FINRA and the exchanges—control plan decision-making. Other market participants, such as regulated funds lack any meaningful voice in the operation of these plans and have no ability to police or monitor the conflicts that arise in the implementation of these plans. As a result, the plans do not function as well as they could and critical information regarding these plans and their operations remain opaque.

    - Third, the opacity of certain aspects of the equity market poses challenges for regulated funds in monitoring whether they are obtaining best execution from broker-dealers. Providing institutional investors such as regulated funds with uniform disclosure about broker-dealer order handling practices and the operation of ATSs must be made a priority.

- Regulators and market participants should address these issues promptly. We recommend the following steps to improve equity market structure:

  - Address conflicts with the maker-taker pricing model. The SEC should conduct a pilot program to evaluate how access fees and liquidity rebates affect trading in highly liquid stocks and whether regulated funds and other investors would benefit from a market structure that significantly reduces the incentives of brokers to route orders based on the levels of fees and rebates at trading platforms.

  - Reform NMS plan governance. NMS plan governing bodies would be far better informed—and better able to police conflicts of interest—if they included non-SROs. All NMS plans should include as voting members a range of market participants, including representatives of regulated funds.

  - Increase transparency of revenues generated by public data feeds. At a minimum, the SEC should require disclosure of the amount of revenue generated by the public data feeds for the equity markets (which are operated by NMS plans), the sources of that revenue, the allocation of the revenue, and the amount and recipient of any revenue distributed to SROs.

  - Improve transparency of order handling practices of broker-dealers. The SEC should require broker-dealers to provide institutional investors with more granular disclosure about their order routing activities.

  - Require ATSs to disclose key information about their operations and operators. All market participants should have access to basic information about how ATSs operate, including whether a particular ATS provides preferential access to certain market participants. ATSs also should be required to disclose publicly any information concerning potential conflicts of interest that may arise as a result of the other business activities of the broker-dealer operators of these trading venues.

  - Continue the SEC Equity Market Structure Advisory Committee (EMSAC). The SEC should renew the charter of the EMSAC to ensure that the Commission and its staff will continue to benefit from the expertise of this Committee. The SEC should act promptly to extend the EMSAC's charter at least two more years and to consider making the EMSAC a permanent advisory committee.

I. INTRODUCTION

My name is Matt Lyons. I am Senior Vice President and Global Trading Manager of the Capital Group. Thank you, Chairman Huizenga, Ranking Member Maloney, and members of the Subcommittee for inviting me to testify.

Since 1931, Capital Group, home of the American Funds, has been singularly focused on delivering superior results for long-term investors. Today, Capital Group manages more than $1.5 trillion in equity and fixed income assets for millions of individual and institutional investors around the world.

I also serve as the Chair of the Investment Company Institute's (ICI) Equity Markets Advisory Committee. ICI members are regulated funds, including mutual funds, exchange-traded funds, closed-end funds, and unit investment trusts in the United States, and similar funds offered to investors in jurisdictions worldwide. As of June 1, 2017, ICI's members manage total assets of US$19.6 trillion in the United States, serving more than 95 million US shareholders, and US$1.6 trillion in assets in other jurisdictions.

I appreciate the opportunity to speak to the Subcommittee regarding the 1975 amendments to the Securities Exchange Act of 1934 (1975 Amendments) and Regulation NMS—the framework for a national market system (NMS) for the US equity market. As an initial matter, the US equity market is widely recognized as being the fairest, most efficient, and most competitive in the world. It allows companies to raise capital to create jobs, grow their business, and innovate by selling ownership stakes to investors.

Regulated funds, such as the funds managed by Capital Group, play a critical part in capital formation in the United States by investing in the equity markets on behalf of millions of retail investors saving for their long-term financial goals, such as the purchase of a home, a child's education, or a secure retirement.[1] We strongly support one of the principal objectives of Regulation NMS, which is to serve the interests of long-term investors and listed companies,[2] and the priority placed by Congress on this objective since the passage of the 1975 Amendments. This objective should continue to drive any potential changes to the equity markets to fuel the American economy and support the American dream.

Although the equity market functions well, it has changed greatly in the 12 years since the Securities and Exchange Commission (SEC or Commission) adopted Regulation NMS in 2005. This regulation

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[1] Households make up the largest group of investors in regulated funds, and nearly 55 million US households own a regulated fund. *See* 2017 Investment Company Factbook at 112, *available at* https://www.ici.org/pdf/2017_factbook.pdf (Factbook). The vast majority of these households own one or more funds that invest in the equity market, and as a result, regulated funds are significant shareholders of public companies. At the end of 2016, regulated funds owned 31 percent of all US corporate equity securities. *See* Factbook at 14.

[2] Securities and Exchange Commission, Regulation NMS, Exchange Act Release No. 51808 (June 9, 2005), 70 Fed. Reg. 37496, 37499 (June 29, 2005), *available at* https://www.gpo.gov/fdsys/pkg/FR-2005-06-29/pdf/05-11802.pdf (Regulation NMS Adopting Release).

is due for an inspection. We believe the SEC should lead efforts to examine and improve equity market structure, and we greatly appreciate the Commission's commitment to conducting its review of the equity markets with extensive input from a wide range of interested parties. As a way to formalize this input, in 2015, the SEC established an Equity Market Structure Advisory Committee (EMSAC), a panel of market structure experts, to advise on potential equity market reforms. We believe that the EMSAC should continue to play an important role in any equity market structure reform.

As Congress considers the current state of the equity market, I would like to provide a number of recommendations on what the regulatory community and market participants can do to modernize equity market structure for the benefit of both long-term investors and the public companies that rely on the equity market to meet their financing needs. As important investors in the equity market, regulated funds strongly support efforts to improve the fair and orderly operation of this market and insure continued investor confidence. In this regard, ICI and its members have long advocated for an equity market structure that embodies certain key principles—minimizing potential conflicts of interest, promoting transparency and liquidity, ensuring stability and resiliency, and treating all market participants fairly and equitably.

My testimony has three parts. First, I explain the evolution of the equity market since the passage of 1975 Amendments and adoption of Regulation NMS, how regulated funds transact in the equity markets, and the role of asset managers, such as the Capital Group. Second, I describe the aspects of equity market structure that pose the most significant challenges to regulated funds as they seek to provide long-term returns to their investors and how certain changes can help foster an equity market structure that is in keeping with an efficient and well-functioning market. Third, I recommend concrete steps that the SEC and market participants should take to address these challenges.

II. REGULATED FUNDS RELY ON BUY-SIDE TRADERS TO NAVIGATE THE MODERN EQUITY MARKET

Congress passed the 1975 Amendments to authorize the SEC to create a national market system for equity securities and a system for nationwide clearing and settlement of securities transactions.[3] The 1975 Amendments aimed to empower the SEC to strengthen the equity markets by linking together the various stock trading venues. The SEC has advanced the objectives of the 1975 Amendments through a variety of means, the most significant of which are Regulation NMS and a series of NMS plans. These regulatory actions in conjunction with technological developments have created a fast-paced, highly electronic market structure with a broad range of market participants pursuing a variety of trading and investment strategies.

It is unclear whether the evolution to a market structure that prioritizes speed has on balance benefited the market or long-term investors. Some of the advantages of these regulatory changes have been improved technology allowing for greater control of the equity trading process from the "buy-side,"

[3] *See* Section 11A of the Securities Exchange Act of 1934.

competition among many trading centers, and ample liquidity and price discovery for the most liquid securities.[4] The negative consequences, however, have been a single, one-size-fits-all equity market characterized by a number of challenges, including: fragmentation of liquidity among multiple trading venues; pricing structures that create opportunities for arbitrage and potential conflicts between broker-dealers and their clients and add complexities to the market; and allowing market participants with inherent conflicts of interest to dictate key aspects of market operations. Inadequate transparency exacerbates these challenges.

Today, equity securities trade on approximately four dozen trading platforms, each with its own fee schedule, rulebook, and unique order types.[5] The national securities exchanges drive price discovery by advertising the prices at which market participants will buy or sell listed securities. Regulation NMS protects these displayed quotations by requiring each trading center—such as an exchange and ATS—to adopt written policies and procedures designed to prevent the trading center from executing a transaction at a worse price than the best bid or offer displayed by a national securities exchange, subject to certain specified exceptions.[6] This prohibition on trade-throughs effectively requires market participants to have the capability to execute at every national securities exchange, regardless of an exchange's market quality or terms of use.

To navigate this fragmented equity market ecosystem in the modern era and implement their investment objectives and strategies, regulated funds rely on asset management firms—and specifically the portfolio managers and traders employed by asset management firms. In managing the portfolio of a regulated fund, a portfolio manager of an asset management firm determines which securities to buy or sell for the fund, in accordance with the objectives described in the fund's prospectus. Traders with the asset management firm (buy-side traders) seek to execute the transactions in the most efficient and cost effective manner to effectuate the fund's investment strategy.

Generally speaking, a buy-side trader's objective when implementing portfolio decisions is to optimize the balance between the market impact and potential opportunity risk.[7] To minimize market impact the trader often will break a portfolio manager's order (parent order) into smaller pieces (child orders), and send these child orders to one or more broker-dealers for execution. To minimize opportunity risk

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[4] It is also clear that transaction fees have decreased since the adoption of Regulation NMS, but it is hard to tell how much of this decrease is attributable to the regulation directly and how much derives from other factors, such as decimalization. Lower transaction fees are a benefit to investors, but I encourage Congress and regulators not to assume a direct, causal relationship between Regulation NMS's adoption and lower transaction fees.

[5] These trading platforms include national securities exchanges and alternative trading systems (ATS). In addition, broker-dealers will "internalize" client orders from time to time, essentially trading with the client directly, without sending the order to an exchange.

[6] *See* 17 C.F.R. § 242.611(a).

[7] If a market participant buys or sells too aggressively, the participant's order can have a meaningful effect on the price of the relevant security, at least in the short term. Conversely, if the strategy is too passive the market participant may fail to get the position into the portfolio to realize the potential gains from the investment.

the trader will look to source large block liquidity and typically is willing to pay a higher impact cost. A fund's broker-dealers typically parcel the child orders into the market in small increments to obtain favorable executions for the fund. The average size of child orders submitted to the market has generally decreased since the implementation of Regulation NMS, possibly because the regulation complicates efforts for institutional investors and liquidity providers to transact in large size.

Broker-dealers owe regulated funds—and other clients—a duty of best execution, which means that a particular broker dealer must exercise reasonable care to obtain the most advantageous terms for its client, taking into account price and other factors.[8] In a fragmented and complicated market structure with many different market centers trading the same security, a broker-dealer's order routing decision is critically important to fulfilling the best execution obligation and buy-side traders devote significant resources to monitoring broker-dealer order handling practices.

III. REGULATED FUNDS SUPPORT A MARKET STRUCTURE THAT MINIMIZES CONFLICTS OF INTEREST AND PROMOTES TRANSPARENCY

To best serve ordinary American investors, regulated funds call for reforms to minimize conflicts of interest and promote transparency in the equity market. Three current practices fall short of these key principles.

- First is a prevalent fee model in the US equity market, known as "maker-taker," which pits broker-dealers' economic interests against those of their customers.
- Second is the governance of NMS plans—plans that administer key aspects of the national market system but are controlled by entities with inherent conflicts of interest. The plans have a significant effect on a wide range of market participants, but self-regulatory exchanges (SROs)—FINRA and the exchanges—control plan decision-making. Other market participants, such as regulated funds lack any meaningful voice in the operation of these plans and have no ability to police or monitor the conflicts that arise in the implementation of these plans. As a result, the plans do not function as well as they could and critical information regarding these plans and their operations remain opaque.
- Third, the opacity of certain aspects of the equity market poses challenges for regulated funds in monitoring whether they are obtaining best execution from broker-dealers. Providing institutional investors such as regulated funds with uniform disclosure about broker-dealer order handling practices and the operation of ATSs—exchange-like trading platforms run by broker-dealers—must be made a priority.

This section describes each of these challenges.

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[8] *See* Financial Industry Regulatory Authority (FINRA), Regulatory Notice 15-46, Best Execution: Guidance on Best Execution Obligations in Equity, Options and Fixed Income Markets (November 2015), *available at* https://www.finra.org/sites/default/files/notice_doc_file_ref/Notice_Regulatory_15-46.pdf.

A. The Maker-Taker Fee Model Presents Significant Conflicts of Interest That Affect Fund Execution Quality and Market Fairness

Our foremost concerns is the "maker-taker" pricing model. This practice, employed primarily by exchanges, involves charging fees to participants that remove liquidity (*i.e.*, "takers") from the market while paying rebates to those participants that add liquidity (*i.e.*, "makers"). Regulation NMS caps access fees at a level that the Commission believed was a *de minimis* amount in 2005—$0.30 per 100 shares, for securities quoted at $1.00 or more.[9] The SEC believed the $0.003 per share cap on access fees would, among other things, enhance the integrity of Regulation NMS by ensuring that trading venues could not charge substantial fees for accessing protected quotations. Regulation NMS does not address rebates but, in practice, the access fee cap acts as a limit on the size of these payments because execution venues typically use the fees collected on one side of a transaction to fund the rebates paid on the other side. A trading venue's net transaction revenue equals the difference between the access fee charged and the liquidity rebate paid by the venue. A venue that offers a liquidity rebate that exceeds its access fee would lose money on every transaction that it matches.

Maker-taker pricing and Regulation NMS's cap on access fees have become controversial features of equity market structure for three primary reasons. First, maker-taker pricing supplies broker-dealers with an incentive to route customer orders in a way that maximizes rebates earned and minimizes fees paid because broker-dealers generally do not pass fees or rebates through to their clients. Trading commissions have decreased dramatically with the increase in electronic trading, and spreads have tightened since decimalization of the US markets, making the current cap on fees more than a *de minimis* component of trading costs today and magnifying the conflict of interest that broker-dealers face in routing client orders. Second, access fees and liquidity rebates diminish price transparency because quoted prices—and prices included on trade reports—do not account for fees or rebates and therefore do not fully reflect net trading prices. Finally, exchange fees and liquidity rebates have contributed to increased market complexity and fragmentation through the proliferation of new trading venues and order types designed to exploit maker-taker pricing.[10]

Maker-taker pricing harms regulated funds and the millions of investors that entrust these funds with their savings in several ways. First, the fees and rebates associated with maker-taker pricing reduce market transparency and impair the ability of regulated funds to evaluate the quality of executions they receive. Second, access fees and liquidity rebates provide incentives that sometimes conflict with a broker-dealer's obligation to provide best execution to a regulated fund's order. Third, the avoidance of fees or the harvesting of rebates results in increased fragmentation the enables otherwise non-

[9] 17 C.F.R. § 242.610(c). This rule also limits fees to 0.3% or less of the price per share for securities quoted at less than $1.00.

[10] Maker-taker pricing, for example, has resulted in the creation of "inverted venues" that pay a rebate to market participants that take liquidity and charge a fee to market participants that post liquidity.

economically viable venues to exist[11] and complex order types that stifle traditional order competition[12] based on time price priority rules. The complexity that results from maker-taker pricing introduces unnecessary friction and risk and reduces necessary transparency to allow asset managers to monitor effectively the performance of their broker-dealers and venues to the detriment of regulated funds and other long-term investors.

B. Equity Market Governance Is Not Structured to Police against Conflicts of Interest and Hinders Transparency

NMS plans are an enduring legacy of the 1975 Amendments and Regulation NMS. Rather than engage in rulemaking in certain key areas, the SEC has chosen to rely on NMS plans to govern key aspects of equity market structure, including public market data feeds (known as securities information processors or SIPs), circuit breakers designed to limit extraordinary volatility in individual stocks, and the consolidated audit trail, which will create a single database containing information for all orders and executions for exchange-listed US equities and options.

All NMS plans share a common, deeply flawed governance framework. An operating committee composed only of SROs makes all decisions concerning the administration and operation of the plan. These decisions are often made behind closed doors and little information is provided concerning the deliberations of the operating committees. Certain NMS plans have an advisory committee that includes broader representation, but advisory committees have no formal voice in plan decisions.

The homogenous nature of NMS plan operating committees means that a broad range of market participants have no meaningful voice in the development of key aspects of equity market structure. SIPs, for example, are the exclusive SEC-approved providers of key market data, including information on national best bids and offers, last sales, and regulatory trading halts. A wide range of market participants must use SIPs to trade, and SIPs charge fees that amount to hundreds of millions of dollars a year. For years SIP operating committees failed to invest adequately in creating resilient, reliable SIPs. Although this situation has improved somewhat following a high-profile SIP outage a few years ago, the governance of the SIP NMS plan does not engender confidence that the SROs are investing adequately in SIP technology. The fact that nearly all exchanges derive significant revenues from selling proprietary market data presents SIP operating committee members with a significant conflicts of interest to ensure that SIP performance lags that of proprietary products.

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[11] Adding to this problem are UTP / CTA tape revenue plans, which were changed in Regulation NMS to allow revenue to be generated for quoting in addition to trade reporting. *See* Regulation NMS Adopting Release at 37557-37568; Exhibit 1 of the Joint Self-Regulatory Organization Plan Governing the Collection, Consolidation and Dissemination of Quotation and Transaction Information for Nasdaq-Listed Securities Traded on Exchanges on an Unlisted Trading Privileges Basis, *available at* http://www.utpplan.com/DOC/Nasdaq-UTP_Plan_after_37th_Amendment_-_Excluding_21st_Amendment.pdf; Section IX of the Consolidated Quotation Plan (Restatement), *available at* https://www.nyse.com/publicdocs/ctaplan/notifications/trader-update/CQ_Plan_Composite_as_of_April_11_2017.pdf.

[12] Order competition is a primary objective of Regulation NMS. *See* Regulation NMS Adopting Release at 37498.

Moreover, there is no public disclosure of even rudimentary information concerning the allocation of SIP revenue among SROs or the amounts expended for SIP maintenance or improvement. The lack of transparency into this information prevents an adequate check on conflicts of interest that are inherent for entities that control the administration of these plans.

Although no legal authority requires SROs to monopolize NMS plan governance, the SEC and SROs have ignored repeated calls from other market participants to democratize the operation of these plans and allow for other market participants to monitor potential conflicts of interest. The lack of diversity of NMS plan operating committees also prevents the committees from being as well informed about the perspectives of other market participants as they should be and may impair the committees' ability to understand fully how their decisions affect non-SROs.

C. Lack of Information Exacerbates Potential Conflicts of Interest in the Market

One result of the fragmentation and associated complexity of US equity market structure is that institutional investors have a compelling interest in understanding the order handling decisions of their broker-dealers and the operations and potential conflicts of interest associated with using ATSs. Unfortunately, the securities laws provide investors with inadequate information about either broker-dealer order handling practices or the operations of ATSs, which complicates regulated funds' efforts to monitor broker-dealers and trading venues.

1. Regulated funds lack transparency into the order-handling decisions of broker-dealers making it difficult for regulated funds to monitor broker-dealer performance

Although Regulation NMS requires broker-dealers to report certain order handling information, these reports focus on retail orders and, in any event, do not provide sufficient information to enable institutional investors to assess satisfactorily the performance of broker-dealers and execution venues.[13] Funds and other institutional investors can request ad hoc reports on the routing and execution quality of their equity market orders, but broker-dealers have the discretion whether to provide these reports and can provide them in varying formats, making it difficult and resource-intensive to compare execution quality across broker-dealers.

Having access to uniform, comprehensive disclosures about the order handling practices of broker-dealers would enhance the ability of regulated funds and other institutional investors (regardless of size or market power) to: (1) understand a broker-dealer's decision to expose, route, and execute an order; (2) evaluate the execution quality provided by a particular broker-dealer or trading venue; (3) determine whether the pricing structure of a trading center influences a broker-dealer's order handling decisions; and (4) assess information leakage with the routing of their orders. Ultimately, these disclosures would provide regulated funds and buy-side traders with a much-needed tool to improve the

[13] *See* 17 C.F.R. §§ 242.605 and 242.606.

execution quality of fund orders, which would reduce costs and improve long-term returns to fund shareholders.

To address buy-side interest in enhancing the level of transparency regarding order routing and execution, ICI and its members in 2014 spearheaded efforts to develop a standardized disclosure template that each broker would provide to its institutional clients. The disclosure template was intended to provide a broad range of statistical data regarding a broker's handling of a specific customer's orders, along with the execution quality achieved by the broker at each execution venue. ICI along with other trade associations submitted this template to the SEC as the product of collaboration among a broad segment of industry participants and to assist the staff in its rulemaking efforts in this area. In 2016, the SEC proposed a rulemaking based on this template, and we hope the Commission will adopt this new rule soon, with certain modifications.[14]

2. Regulated funds need more comprehensive information about ATSs, including basic disclosures about their business and the conflicts of interest associated with their operations

Market participants, including regulated funds, also lack adequate transparency into the operations of ATSs. SEC rules permit ATSs to operate in a far less transparent manner than national securities exchanges, even though ATSs, in aggregate, execute more than 15 percent of the total dollar volume of all transactions in exchange-listed equities. ATSs must register with the Commission, but all information reported on their registration form and subsequent filings that they make with the SEC are deemed confidential.

Consequently, each ATS has a great amount of control over the information that it chooses to make available publicly. Some ATSs disclose nearly all information they file with the SEC while others disclose practically none, choosing instead to keep confidential even basic information about their operations, fee schedules, or the potential conflicts of interest that might arise as a result of the activities of their broker-dealer operators. Requiring ATSs to disclose this information publicly would ensure that regulated funds and other market participants have access to all information necessary to evaluate these trading venues, including information concerning how ATSs treat different classes of subscribers, the extent to which information is shared outside the ATS, and whether business arrangements of the broker-dealer that operates the ATS potentially conflict with the best interest of ATS subscribers.[15]

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[14] Securities and Exchange Commission, *Disclosure of Order Handling Information*, Securities Exchange Act Release No. 78309 (July 13, 2016), 81 Fed. Reg. 49432 (July 27, 2016), *available at* https://www.gpo.gov/fdsys/pkg/FR-2016-07-27/pdf/2016-16967.pdf.

[15] A number of recent SEC enforcement actions against ATSs and broker-dealers operating ATSs highlight harms that can result if broker-dealer operators of ATSs do not appropriately manage potential conflicts of interest. *See e.g.*, *In the Matter of ITG Inc. and Alternet Securities Inc.*, Securities Exchange Act Release No. 75672 (Aug. 12, 2015), https://www.sec.gov/litigation/admin/2015/33-9887.pdf; *In the Matter of UBS Securities LLC*, Securities Exchange Act Release No. 74060 (Jan. 15, 2015), http://www.sec.gov/litigation/admin/2015/33-9697.pdf; *In the Matter of Lavaflow,*

The paucity of public information on ATSs contrasts starkly with the copious public disclosures that SEC rules compel stock exchanges to make. The uneven regulatory landscape between ATSs and exchanges may have been appropriate when the Commission adopted its rules on ATSs almost 20 years ago, but now that ATSs have become a more significant part of the trading environment, registered funds must have more information to assess fully the relative merits of these functionally similar trading venues.

Exchanges and ATSs play similar roles in the equity market; we believe they should have similar disclosure obligations. The regulated fund industry has supported efforts to improve ATS disclosures and align these disclosures more closely with those of national securities exchanges. Most recently, the industry supported an SEC proposed rule that would require ATSs to disclose publicly a broad range of information about their operations and the businesses of their broker-dealer operators.[16]

IV. RECOMMENDATIONS TO IMPROVE EQUITY MARKET STRUCTURE

The conflicts of interest inherent in maker-taker pricing and the governance of NMS plans and the opacity surrounding broker-dealer order handling practices and ATS operations work to undermine the fairness and integrity of equity markets. Regulators and market participants should address these issues promptly. We recommend the following steps to improve equity market structure:

- Address conflicts with the maker-taker pricing model. The SEC should conduct a pilot program to evaluate how access fees and liquidity rebates affect trading in highly liquid stocks and whether regulated funds and other investors would benefit from a market structure that significantly reduces the incentives of brokers to route orders based on the levels of fees and rebates at trading platforms. A discrete, well-designed pilot program would provide data that would allow the SEC to advance its equity market structure agenda and bring real benefits to investors. Any maker-taker pilot program should test how eliminating rebates affects trading and liquidity in pilot securities. A pilot program should provide the SEC with data upon which to make informed policy decisions on the best way forward. Data-driven policy determinations should diminish the potential for unintended consequences of regulatory changes. We note that the EMSAC has proposed a framework for a maker-taker pilot, and we urge the SEC to propose a maker-taker pilot program.

- Reform NMS plan governance. No legal authority requires SROs to monopolize NMS plan governance, and the NMS plan governing bodies would be far better informed—and better able to police conflicts of interest—if they included non-SROs. The proliferation of NMS plans in recent years as mechanisms to regulate the equity markets heightens these plan governance concerns. All

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Inc., Securities Exchange Act Release No. 72673 (Jul. 25, 2014), http://www.sec.gov/litigation/admin/2014/34-72673.pdf; *In the Matter of Liquidnet, Inc.*, Securities Exchange Act Release No. 72339 (Jun. 6, 2014), http://www.sec.gov/litigation/admin/2014/33-9596.pdf.

[16] Securities and Exchange Commission, *Regulation of NMS Stock Alternative Trading Systems*, Securities Exchange Act Release No. 76474 (November 18, 2015), 80 Fed. Reg. 80998 (December 28, 2015), *available at* https://www.gpo.gov/fdsys/pkg/FR-2015-12-28/pdf/2015-29890.pdf.

NMS plans should include as voting members a range of market participants, including representatives of regulated funds.

- Increase transparency of SIP revenues. At a minimum, the SEC should require disclosure of the amount of revenue generated by the SIPs, the sources of that revenue, the allocation of the revenue (including amounts invested in technology), and the amount and recipient of any revenue distributed to an SRO under the SIP plans. The disclosure of this type of information will allow market participants to monitor whether sufficient technology investments are being made and whether such decisions are influenced by SRO conflicts of interests.

- Improve transparency of order handling practices of broker-dealers. The SEC should require broker-dealers to provide institutional investors with more granular disclosure about their order routing activities. The SEC should adopt its proposal to enhance order routing disclosures for institutional investors with modifications recommended by ICI as soon as possible. Greater disclosure would empower regulated funds and other institutional investors to make much better informed decisions about how their brokers are performing and to improve execution quality to benefit the millions of retail investors in regulated funds.

- Require ATSs to disclose key information about their operations and operators. All market participants should have access to basic information about how ATSs operate, including whether a particular ATS provides preferential access to certain market participants. ATSs also should be required to disclose publicly any information concerning potential conflicts of interest that may arise as a result of the other business activities of the broker-dealer operators of these trading venues. The SEC should promptly adopt its proposal to require public disclosure of this key information to allow regulated funds to make better informed routing decisions and evaluate the performance of broker-dealers. Absent regulatory action, market participants will continue to have difficulty obtaining this critical information and certain market participants, especially smaller regulated funds, may not be able to obtain this information at all.

- Continue the EMSAC. The SEC should renew the charter of EMSAC so that it can continue its work supporting the SEC. For more than two years the EMSAC has examined US equity market structure, including maker-taker pricing, order handling transparency, NMS plan governance, and other matters. Unfortunately, the EMSAC's term expires in August 2017. To ensure that the Commission and its staff will continue to benefit from the expertise of this Committee, the SEC should act promptly to extend the EMSAC's charter at least two more years and to consider making the EMSAC a permanent advisory committee.

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I appreciate the opportunity to share these views with the Subcommittee. Capital Group and ICI look forward to continued engagement with Congress on matters of importance to regulated funds and their investors.

Appendix

Recent ICI and Capital Group Companies, Inc. Comment Letters on Market Structure Issues

Letter concerning maker-taker fees:

- Letter from David W. Blass, General Counsel, ICI to SEC EMSAC, dated January 20, 2016, *available at* https://www.ici.org/pdf/29652.pdf

Letters addressing NMS plan governance:

- Letter from Paul Schott Stevens, President & CEO, ICI, to Mary Jo White, Chair, SEC, dated October 19, 2016, *available at* https://www.ici.org/pdf/30325.pdf

- Letter from David W. Blass, General Counsel, ICI, to Brent J. Fields, Secretary, SEC, dated July 18, 2016, *available at* https://www.ici.org/pdf/30042.pdf

- Letter from Paul Schott Stevens, President & CEO, ICI, to Mary Jo White, Chair, SEC, dated November 30, 2015, *available at* https://www.ici.org/pdf/29517.pdf

Letters urging increased transparency of order handling decisions and ATS operations:

- Letter from Matt Lyons, Global Trading Manager, The Capital Group Companies, Inc. to Brent J. Fields, Secretary, SEC, dated September 30, 2016, available at https://www.sec.gov/comments/s7-14-16/s71416-25.pdf

- Letter from David W. Blass, General Counsel, ICI, to Brent J. Fields, Secretary, SEC, dated September 26, 2016, *available at* https://www.ici.org/pdf/16_ici_sec_order_routing_ltr.pdf

- Letter from David W. Blass, General Counsel, ICI, to Brent J. Fields, Secretary, SEC, dated February 25, 2016, *available at* https://www.ici.org/pdf/29733.pdf

TESTIMONY

OF

ARI RUBENSTEIN

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GTS

BEFORE THE

HOUSE COMMITTEE ON FINANCIAL SERVICES

SUBCOMMITTEE ON CAPITAL MARKETS, SECURITIES AND INVESTMENT

"U.S. EQUITY MARKET STRUCTURE: A REVIEW OF THE EVOLUTION OF TODAY'S EQUITY MARKET STRUCTURE AND HOW WE GOT HERE"

JUNE 27, 2017

Introduction

Thank you Chairman Huizenga, Ranking Member Maloney and distinguished members of the Committee.

It is a personal honor for me to be here today to discuss with you these important market structure issues and how we can keep America #1 in capital markets and finance. Almost twenty-five years ago this summer, I started as a runner on the floor of the commodities exchange at the former World Trade Center, where the biggest piece of technology we had was a telephone. Approximately a decade later I felt technology could evolve our markets and bring enormous benefits to investors. At that point, I helped start my current company, GTS.

GTS is an electronic market maker. We provide offers to buy and sell thousands of investment instruments electronically across global markets. In the U.S. cash equity markets, on any given day we might trade between 3% and 5% of the consolidated daily volumes. All of our trading is quantitatively driven and automated using computers.

We are also the largest designated market maker ("DMM") at the New York Stock Exchange. This means we are uniquely and directly responsible and accountable to over 900 public companies for making sure there is ample liquidity for their investors to access throughout the day. That list includes some well-known companies such as Exxon Mobil, Berkshire Hathaway, AT&T and 161 other companies in the S&P 500. Most recently, we handled the IPO of the tech company Snapchat, which was the largest IPO of the past 3 years and raised nearly four billion dollars for the company and its workers.

Our goal at GTS is to do for the capital markets what Amazon has done for online commerce: Use technology in a responsible way to promote efficiency for public

companies, and save their investor's money. We do this by adhering to our core principles of transparency and innovation. That yields investor confidence and lower costs. Our efforts help companies raise capital, grow and employ workers.

Evolution of our Capital Markets

We've witnessed the capital markets evolve tremendously since the days I was yelling buy and sell orders on the exchange floor. Like many industries, technology has transformed the business, making the markets more fair and efficient for all participants. And just like the conveniences and cost savings we enjoy using the internet and technology, the financial markets participate in the same way.

The emergence of advanced algorithmic trading, coupled with regulatory initiatives promulgated by the Securities and Exchange Commission (SEC) since 1996,[1] have resulted in highly competitive equity markets, in which trading is dispersed across a wide variety of market centers ranging from public venues to private trading pools to individual broker-dealers. As a result, investors are doing much better in today's algorithmic marketplace than they did in the old manual markets.[2]

For example, thanks to the advanced technology that electronic market makers have deployed, the cost to trade has declined dramatically. The average trading cost for investors has come down by more than 50 percent in the last 10 years.[3] This results in

[1] Today's U.S. equity market structure was shaped by four main regulatory initiatives, including the Order Handling Rules in 1996, Regulation ATS in 1998, Decimalization in 2000 and Regulation NMS in 2005.

[2] In a speech on June 5, 204, former SEC Chair Mary Jo White highlighted lower execution costs, reduced intraday volatility and extremely narrow spreads as evidence that investors are better off in today's algorithmic marketplace. You can view the speech here: https://www.sec.gov/news/speech/2014-spch060514mjw

[3] Source: TABB Group Reg One Solutions, Effective/quoted spread for market orders of 100 – 1999 shares in the S&P 500. View the chart here: https://modernmarketsinitiative.org/wp-content/uploads/2016/03/Capture.jpg

more money in the accounts of investors when they retire. Due to today's reduced trading costs, investments in a retirement account over a 30 year period, will end up with a 30 percent higher return.[4]

There were concerns late last decade that the vulnerability of electronic systems would pose a threat to the markets. These concerns, which arose as a consequence of some high-profile market disruptions, such as the "flash crash" in 2010 and the Knight Capital trading incident in 2012, led the SEC and the Financial Industry Regulatory Authority (FINRA) to enact rules to improve market infrastructure.

For instance, market access rules enacted in 2010 now ensure that broker-dealers with direct access to trading on an exchange or alternative trading system have procedures in place to effectively manage the financial, regulatory and other risks of this business activity;[5] Regulation Systems Compliance and Integrity (Regulation SCI) enacted in 2014 strengthened the technology infrastructure of the U.S. securities markets by imposing requirements that reduce the occurrence of systems issues and improve resiliency when systems problems do occur;[6] and rules adopted in 2016 put in place a plan to create a single, comprehensive database known as the consolidated audit trail that will enable regulators to more efficiently track all trading activity in the U.S. equity markets.[7]

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[4] Hal Scott, "Why U.S. Investors are Better Off Today," Washington Times, January 21, 2016. According to the article, Vanguard estimates that the shift from the old market structure to today's automated market structure has reduced trading costs by 35-60 percent, resulting in a 32% greater yield for long-term investors. View the article here: http://www.washingtontimes.com/news/2016/jan/21/hal-scott-why-us-investors-are-better-off-today/

[5] View the SEC's press release on Rule 15c3-5 here: https://www.sec.gov/news/press/2010/2010-210.htm

[6] View the SEC's press release on Regulation SCI here: https://www.sec.gov/news/press-release/2014-260

[7] View the SEC's press release on the Consolidated Audit Trail here: https://www.sec.gov/news/pressrelease/2016-240.html

These positive and necessary advancements to our market structure – among others[8] - have resulted in tighter spreads, improved competition, improved operational resiliency and far greater efficiency.

Looking Ahead

Despite the improvements to our market structure, there is certainly more to be done. Former SEC Chair, Mary Jo White, said it best when she stated in a 2014 speech that "the current market structure is not fundamentally broken, let alone rigged. To the contrary, the equity markets are strong and generally continue to serve well the interests of both retail and institutional investors." She went on to say that "the largely positive data on broad market quality does not mean, however, that the current market structure [cannot be improved]."[9] I could not agree more.

However, we should not squander our resources trying to fix problems that don't exist. I've witnessed a lot of alarms being rang for problems that really aren't there, and then hear proposed solutions that are questionably positive in the grand scheme of things.

One example is a recent proposal by the BATS exchange to offer an alternative closing auction for securities listed on other markets.[10] This is nothing more than a money grab for Wall Street that is striking fear in many of the public companies and their investors that we are here to serve.

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[8] Other regulatory initiatives that have improved market infrastructure include single stock and market-wide circuit breakers, "limit up-limit down" mechanisms for individual stocks, and large trade reporting improvements.

[9] See a speech by Former SEC Chair, Mary Jo White, "Enhancing Our Equity Market Structure" delivered on June 5, 2014 here: https://www.sec.gov/news/speech/2014-spch060514mjw

[10] View the Bats proposed rule to Introduce Bats Market Close here: https://www.sec.gov/rules/sro/batsbzx/2017/34-80683.pdf

While GTS agrees that fragmentation has generally been good for the U.S. markets, fragmenting order flow in the closing auctions - as the Bats proposal attempts to do - will rob issuers of the right to choose which exchange manages the closing auction of their shares. The closing auctions are one of the critical features of listing on an exchange. Issuers want a centralized closing process for their shares because of the integrity of the closing price derived by the centralized auctions. If we take away this most basic and fundamental feature of our equity market structure, issuers will have yet one more reason to forgo going public and listing on an exchange. This would be disastrous for the U.S. capital markets and for its investors.

There are multiple small, mid, and large cap companies extremely alarmed by the Bats proposal. I've outlined and cited much of this specific outcry in a letter I filed recently with the SEC, and have attached that letter as an appendix to this testimony.

So here's what we should be spending our time on:

Greater Resilience to Cybersecurity Threats:

First, we need greater resilience to cybersecurity. This is often overlooked in the debate about market structure, but an all-electronic market, like many other technology-dependent sectors in the economy, needs to be vigilant on this issue. The SEC's own cyber-security sweep conducted in 2014 revealed that, of the more than 100 companies examined, 88 percent of the broker-dealers and 74 percent of the investment advisers had experienced a cyber-attack.[11]

[11] Craig Newman, "Securities and Exchange Commission Gets Tough on Cyber Security," The Financial Times, January 17, 2016. View the article here: https://www.ft.com/content/d5eda03e-b87c-11e5-b151-8e15c9a029fb?mhq5j=e2

Despite great work that the regulators[12] and industry have done, we need to double down on our efforts to prevent hacking and cyber-attacks. We need a better system for sharing information between key stakeholders, because we all have a collective interest in preventing such a problem.

Improve Investor Confidence by Identifying and Eliminating Fraud and Abuse:

Next, we need to do more to detect electronic trading fraud and abuse. I am a member of the FINRA market surveillance advisory group, whose goal is to assist FINRA in the construction of an advanced artificial intelligence (A.I.) and machine learning system to eradicate nefarious activity in our markets.[13] This is a great and impressive start, but more time and budget is necessary to complete these projects.

By leveraging today's technology, such as A.I. and machine learning, regulators and private industry can better identify and weed out bad actors in our markets. Doing so will improve investor confidence, which is essential to widespread participation in any market.

Improving the SIP :

And finally, we need to further improve the Securities Information Processor (SIP), which links the U.S. markets by processing and consolidating all protected bid/ask quotes and trades from every trading venue into a single, easily consumed data feed.

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[12] The SEC, for example, has created a senior role specifically dedicated to coordinating the Commission's cybersecurity policy, has increased its attention to cyber threats with stepped up enforcement (see article above) and recently released its Office of Compliance Inspection and Examinations' 2017 priorities, which underscore the importance of strong cybersecurity compliance procedures and controls. You can view the priorities here: https://www.sec.gov/news/pressrelease/2017-7.html.

[13] Learn more about the Market Surveillance Advisory Group in FINRA's March 21, 2017 Special Notice here: http://www.finra.org/sites/default/files/notice_doc_file_ref/Special-Notice-032117.pdf

The SIP has been identified as a "single point of failure" by the SEC, which means it can halt or severely disrupt trading when a problem occurs.[14] In addition, the SIP has been blamed for creating a two-speed marketplace since SIP data moves slower than exchange direct-feed data.

Investors need the most accurate information possible when making investment decisions. While investors and market participants have equal access to all publically available data, the SIP is the most widely used and least expensive solution. The perception of a SIP feed that disseminates information at a significant disadvantage to direct feeds will eventually drain investor confidence. Therefore, regulators should consider proposals to further upgrade this critical piece of market infrastructure.

Conclusion:

Our markets are stronger and more efficient than ever and certainly the envy of the world. But we should not rest on our laurels. We need to avoid potentially costly experiments, and instead use those scarce resource to improve the markets, which will help advance investor confidence.

Thanks to the innovative and principled hard work of smart dedicated people from the industry and the various regulatory bodies, we can deploy these changes from a position of strength.

I appreciate the opportunity to present my views to the Committee today and I look forward to answering any questions you may have.

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[14] See a speech by Former SEC Chair, Mary Jo White, "Enhancing Our Equity Market Structure" delivered on June 5, 2014 here: https://www.sec.gov/news/speech/2014-spch060514mjw

APPENDIX

Ari M. Rubenstein
Co-Founder & CEO
545 Madison Ave; 15th Floor
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June 22, 2017

Brent J. Fields, Esq.
Secretary
U.S. Securities and Exchange Commission
100 F Street, NE
Washington, D.C. 25049

Re: SR-BATSBZX-2017-34

Dear Mr. Fields:

This letter sets forth the comments of GTS Securities LLC ("GTS") on the above-referenced proposed rule change by Bats BZX Exchange, Inc. ("BZX") to offer an alternative closing process for securities listed on other exchanges.[1] If approved, this alternative closing process (called the "Bats Market Close") would offer the ability for market on close orders ("MOC") to be matched on BZX at the official closing price of the primary listing markets of the New York Stock Exchange ("NYSE") and Nasdaq.

Introduction

GTS is a global electronic market making firm which provides liquidity in U.S. cash equities, ETFs, futures, foreign exchange and government debt. In U.S. cash equities, our overall volumes typically range from 3.5% to 5% of the average daily turnover. As a designated market maker ("DMM") on the NYSE, we are responsible for 1200 common stocks with a total market capitalization of $11.4 trillion. Our trading on the NYSE represents about 20-25% of the total notional volumes we trade each day. We are active on other equities markets such as BZX, BYX Exchange ("BYX"), EDGA Exchange ("EDGA"), EDGX Exchange ("EDGX"), Nasdaq and various alternative trading systems (called "dark pools").

In our role as a DMM on the NYSE, we have special obligations to provide liquidity throughout the trading day, and must maintain the orderly opening and closing auctions for our issuers. Among our issuers are 164 companies in the S&P 500. Our position as a DMM demands that we help build and sustain investor confidence in our markets. As such, we are quick to support new proposals that make our markets stronger.

In its proposal, BZX states that the Bats Market Close will "provide for a competitive alternative to sending orders to the primary listing market's closing auction."[2] BZX urges the SEC to approve its proposal so as to allow BZX to offer a "fee competitive alternative" to the primary listings markets' closing auctions.[3]

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[1] See also the comments of Ari Rubenstein in a forthcoming Wall Street Journal op-ed. Ari Rubenstein, *It's the Companies, Stupid*, WALL STREET JOURNAL (forthcoming June 2017).

[2] Notice of Filing of a Proposed Rule Change to Introduce Bats Market Close, Exchange Act Release No. 80683 at 7 (May 16, 2017), 82 FR 23320, 23322 (May 22, 2017).

[3] *Id.* at 9, 82 FR at 23322.

Over the past twenty years, the SEC's policy of promoting competition has brought tremendous innovation and pricing efficiencies to the equity markets. The U.S. has thirteen national securities exchanges trading listed equities, including the new Investors Exchange ("IEX") with its novel market model. The SEC's adoption of Regulation ATS in 1998 permitted broker-dealers to compete with the equity exchanges in the form of dark pools and electronic liquidity providers.[4] In 2007, the implementation of the SEC's Regulation NMS further enhanced competition by requiring brokers to route to the market with the best price that is immediately accessible.[5] The competition created by the SEC's policies has benefited investors with lower transaction costs and the ability to choose among over 40 venues.

The BZX and BYX exchanges, along with EDGA and EDGX, have been leaders within this competitive arena by offering market participants highly innovative, advanced technology platforms and a low cost alternative. These Bats exchanges have excelled at pushing our markets forward to the benefit of all participants.

Firms like GTS with electronic market making models have stepped into this competitive fray and thrived. Our success is based on our ability to build and maintain the technology infrastructure necessary to trade in fragmented markets. We welcome innovation and competition in the marketplace.

There is no doubt that firms like ours would benefit from the potential reduction in execution fees should the BZX proposal be approved. GTS along with all the Wall Street intermediaries could save millions in reduced transaction costs. But we are deeply concerned that the BZX proposal will have serious and adverse consequences for public companies.

While we believe that fragmentation has generally been good for the U.S. markets, fragmenting order flow in the closing auctions will rob issuers of the right to choose which exchange manages the closing auction of their shares. The closing auctions are one of the critical features of listing on an exchange. Issuers want a centralized closing process for their shares because of the integrity of the closing price derived by the centralized auctions. If we take away this most basic and fundamental feature of our equity market structure, issuers will have yet one more reason to forgo going public and listing on an exchange. This would be disastrous for the U.S. capital markets and for its investors.

The Listed Companies

In our role as a DMM, we communicate with our issuers on a daily basis. Issuers need information about the market and the trading of their shares. We know firsthand that the integrity of their share price is crucial to our companies and their investors.

We are deeply concerned that the BZX proposal, if approved, would jeopardize the most relied upon price discovery mechanism in the U.S. capital markets. The BZX proposal is designed to divert market orders to BZX that would otherwise contribute to the quality of the auctions operated by NYSE and Nasdaq. BZX claims that taking these MOC orders out of the primary market auctions will not "compromis[e] the price discovery function performed by the primary listing market's closing auctions."[6] But diverting MOC orders from the

[4] Regulation of Exchanges and Alterative Trading Systems, Exchange Act Release No. 40760 (Dec. 8, 1998), 63 FR 70844 (Dec. 22, 1998).

[5] Regulation NMS, Exchange Act Release No. 51808 (June 9, 2005), 70 FR 37496 (June 29, 2005).

[6] *Id.* at 6, 82 FR at 23321.

auctions has the potential to disrupt the balanced design of the auctions, and with it, the integrity of the closing price.

The market orders that participate in the closing auctions are a vital component of the liquidity ecosystem that make the closing price on the primary market reflective of investor demand. As described in more detail by NYSE and Nasdaq, it is precisely the centralization of different segments of the market that creates the reliability and value of their closing auction prices.[7]

The closing price set by the primary exchange is the most important trade of the day for publicly listed companies. It is sacrosanct and is often referred to as the *official* closing price by analysts and the financial press. The closing price is the price that thousands of ETFs and mutual funds rely on to calculate their value every trading day. These funds tie their valuation to the closing prices of the primary market precisely because these prices are seen as a reliable, daily valuation of a company's stock. Just as important, the closing price is used as the settlement price for derivatives transactions traded around the world. The public companies themselves use the closing price for various purposes in connection with their employee share purchase plans. In fact, the closing price is widely understood to be so critical for the valuation and the pricing of assets that the SEC and other securities regulators actively monitor the close for bad actors who might seek to undermine the closing price for their own manipulative purpose.[8]

Looking outside the U.S., the top listings markets operate a centralized auction using all market demand to set the closing price. If the US market were to experiment with de-centralizing the closing auctions, it would be an experiment without precedent and one that could seriously impair the confidence of public companies and investors alike.

Issuers who list on the NYSE and Nasdaq want all orders centralized in the pricing of their stock. Here is what some of the public companies we serve have told us:

> "*We depend on NYSE to oversee our close, and we don't want that to change. The closing auction was one of the factors that led us to list with NYSE in the first place.*" David Demshur, CEO, Core Laboratories[9]
>
> "*We at American Renal Associates Holdings, Inc. prefer that the NYSE continue to handle the closing auction of our stock. We see no reason to alter this deeply liquid and proven process and risk*

[7] *See* Letter from Elizabeth K. King, Gen. Counsel & Corporate Sec'y, NYSE, to Brent J. Fields, Sec'y, Sec. & Exch. Comm'n (June 13, 2017); Letter from Edward S. Knight, Exec. Vice President & Gen. Counsel, Nasdaq, to Brent J. Fields, Sec'y, Sec & Exch. Comm'n (June 12, 2017) ("Nasdaq Letter"). As Nasdaq has stated, "Each and every order plays a key role in finding that optimal price, whether it be a Market On Close order, Limit On Close Order…or any other order residing in [the] order book." Nasdaq Letter, at 3.

[8] *See* Athena Capital Research, LLC, Exchange Act Release 73369, Advisers Act Release 3950 (Oct. 16, 2014). In explaining the importance of the integrity of the primary market closing auctions, the SEC stated that "[m]anipulating the closing process can increase market volatility (thereby frustrating the very purpose of the closing auction) and throw off critical metrics linked to the closing price of stocks. A stock's closing price is the data point most closely scrutinized by investors, securities analysts, and the financial media, and is used to value, and assess management fees on mutual funds, hedge funds, and individual investor portfolios." *Id.* at 3.

[9] Core Laboratories N.V. (NYSE: CLB) has a market capitalization of approximately $4.46 billion and serves oil companies around the globe by providing data and technology to optimize petroleum reservoir performance. The reservoir data and technology that Core Lab provides allow companies to determine the value and enhance the production of oil and natural gas. For a complete description of Core Lab's business, see CORE LABORATORIES, www.corelab.com (last visited June 21, 2017).

> *introducing uncertainty and volatility into the most critical period in the trading day.*" Darren Lehrich, SVP, Strategy & Investor Relations, American Renal Associates[10]
>
> "*We would hate to see the most important trade of the day fractured among Wall Street firms.*" Mark Stegeman, CFO, Turning Point Brands[11]
>
> "*It is important to keep a transparent, reliable and consistent closing auction on behalf of listed companies, so that it does not become fragmented and hurt true price discovery at a cost for profit only.*" Frank O'Neil, Chief Communication Officer & Senior VP, ProAssurance Corp.[12]

Those are just a sample of some of the small and midcap companies who have directly voiced their concerns. We know of other large companies also concerned including International Paper (NYSE: IP), a $23 billion company with over 55,000 employees.

These issuers represent just some of the companies that chose to list their shares on an exchange because of the confidence they have in the exchange market processes. These are companies that have tapped the U.S. capital markets to help them grow and create jobs in our country.

The slower pace of companies seeking to IPO over the years and the preference of many smaller companies to remain private has been a great concern to Congress and the SEC. There have been efforts to reverse this trend including the Jumpstart Our Business Startups Act and the industry-wide "tick pilot" to give greater market making support to these companies. In his written testimony for his confirmation hearing, SEC Chairman Jay Clayton expressed concern over the lack of incentives for companies to IPO stating "....it is clear that our public capital markets are less attractive to business than in the past. As a result, investment opportunism for Main Street investors are more limited. Here, I see meaningful room for improvement."[13] Approval of the BZX proposal and taking away the centralized closing auctions would simply add one more reason for a company to resist going public and listing on an exchange.

Wall Street exists because of the stocks of public companies and these companies are the foundation of our robust equity and options trading markets. We need to listen to what public companies say they need and want from the market structure and not just implement what will benefit Wall Street intermediaries. Depriving issuers of the critical function provided by the listing exchanges imperils the long-standing and important

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[10] American Renal Associates Holdings, Inc. (NYSE: ARA) has a market capitalization of approximately $576 million and provides outpatient dialysis services to patients with chronic kidney disease. ARA uses a physician joint venture model, partnering with physicians to own and operate its dialysis clinics. *See* AMERICAN RENAL ASSOCIATES, www.americanrenal.com (last visited June 21, 2017).

[11] Turning Point Brands, Inc. (NYSE: TPB) has a market capitalization of approximately $306.8 million and manufactures and markets a variety of tobacco and nontobacco smoking products. Turning Point offers several categories of products, including smoking, smokeless, vapor and non-nicotine. *See* TURNING POINT BRANDS, www.turningpointbrands.com (last visited June 21, 2017).

[12] ProAssurance Corp. (NYSE: PRA) has a market capitalization of approximately $3.21 billion and is a healthcare-focused insurance writer. ProAssurance provides insurance to cover healthcare professional liability, products liability for medical technology and life sciences, legal professional liability, and workers' compensation. *See* PROASSURANCE, www.proassurance.com (last visited June 21, 2017).

[13] Jay Clayton, Nominee for Chairman, Sec. & Exch. Comm'n, Opening Statement to the Senate Committee on Banking, Housing and Urban Affairs (Mar. 23, 2017).

relationship between issuers and their exchanges. If Wall Street does not continue to provide a system that supports the public companies, then these companies will go elsewhere or will not go public at all.

The Fees for Closing Auction Transactions

The BZX proposal is an attempt by Bats to introduce pricing competition to closing auction fees. There is no denying that the intense competition for transactions during the regular trading day has benefited investors. Spreads have tightened for stocks to just pennies even though this competition has significantly fragmented the equity markets.

It is appealing to think that every feature of our markets could be improved by more competition. But the closing auctions are simply different than continuous trading. The closing auctions cannot tolerate the fragmentation that exists in the regular trading day. Fragmenting the close would seriously undermine the integrity of the prices discovered in the auctions.

Should there be pricing issues for stocks within the continuous market, there are many regulatory mechanisms in place (e.g., public quote streams, last sale reporting, etc.) to bring prices back in line. Investors often have time and the discretion during the trading day to wait for the most opportune price. As well, there is time to fix a mispriced transaction and with it, the opportunity to maintain a fair and orderly market. But the auctions are different by their nature given that the closing price is determined at a single point in time, taking into account all trading interest at that time. Introducing any unreliability into the closing auction would be a mistake. Accordingly, it is critical that the closing auction include the full breadth of the market demand so that the closing price is an accurate reflection of the company's market price. As such, to be of value, closing auctions demand the centralization of available orders.

To be clear, we do not believe the fees charged by the NYSE and Nasdaq for participating in the primary markets' closing auctions to be excessive. In fact, the costs of participating in the closing auctions seem to be in line with what it costs to trade on a variety of venues during the trading day.

For example, the average cost per share for a medium sized participant on the closing auction of the NYSE is $.0009 per share. This charge is in line with what IEX charges the majority of their participants during the trading day – $.0009 per share -- in the continuous market. The typical cost to trade in a dark pool during the continuous market is $.001 per share.[14]

We do not see a problem that needs fixing -- and certainly not with a solution that could imperil the most important trade of the day. The closing auctions work well and represent years of investment and fine tuning by the primary markets.

By their nature, the closing auctions thrive based on the centralization of order flow. There is nothing "anticompetitive" about wanting to protect this centralization. There is plenty of competition for corporate listings between the NYSE and Nasdaq, BZX and perhaps soon IEX.[15] If BZX wants to offer pricing

[14] We do not mean to suggest that the fees charged by NYSE and Nasdaq for the closing auctions should not be subject to proper vetting and review by the SEC and market participants. The fees for these auctions must be set at reasonable levels so as to ensure fair access and full participation of all investors.

[15] IEX's approval by the SEC as a national securities exchange in June 2016 included the approval of rules applicable to the qualification, listing and delisting of companies on IEX. See Application of Investors' Exchange, LLC for Registration as a National

competition in primary listing auctions, BZX has every opportunity to compete by attracting listings of its own. With its own listings, BZX can operate a closing auction for the public companies that choose BZX, not the companies that have chosen another listing venue.

Increasing Operation Risk and Complexity

BZX claims that allowing a fragmented closing process will help mitigate operational risk. We fail to see how adding more complexity at the end of the trading day will mitigate operational risk for traders or for regulators.

As described by BZX in its proposal, the cut-off time for entering MOC orders in the Bats Market Close will be 3:35 ET. At the MOC cut-off time, BZX will match all the buy and sell MOC orders based on time priority. Any remaining balance of unmatched shares will be cancelled back to members. At this point in the process, given that the cut-off time for the primary exchanges is 3:45 for the NYSE and 3:50 ET for Nasdaq, the unfilled market orders must be handled quickly to ensure they get the best opportunity for a closing print. As a result, the BZX proposal will force market participants to send MOC orders from one exchange to another just prior to the relevant cut-off times for the closing auctions.

Should there be technology disruptions at an exchange or even at a BZX member firm near the end of the day, the added complexity of sending these orders from market to market will put even more stress on the systems of the exchanges. Why should we introduce more complexity and the potential for disruption to the most critical point of the trading day? Given the importance of the closing auctions, we suggest that the SEC and market participants put renewed focus on strengthening the stability of these auctions, rather than making them more complex. The BZX proposal seems at odds with the efforts of the SEC through its adoption of Regulation SCI to make sure the exchanges have the operational capacity to promote the maintenance of fair and orderly markets.

In addition to the operational complexity the proposal would introduce, it is not clear whether BZX has considered what additional complications a fragmented close will have on the market surveillance systems of the self-regulatory organizations, especially those market surveillance systems of the primary listing markets. Should the SEC allow order flow to be fragmented among multiple exchanges for the closing auction process, it is certain that surveillance of the close will become more difficult and the costs for this surveillance will go up.

Conclusion

We appreciate the opportunity to provide our views on the BZX proposal to offer an alternative closing process for securities listed on other exchanges. While fee reductions would benefit firms like GTS, we do not believe the proposal is in the public interest.

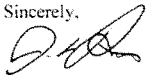
The BZX proposal is a solution in search of a problem. We should not get carried away with the idea that our markets must compete just for the sake of competing. The competition we promote must be for the purpose of making our market stronger and supporting public companies.

Securities Exchange, Exchange Act Release No. 78101 (June 17, 2016), 81 FR 41142 (June 23, 2016). The IEX has announced that it plans to begin its listing program in 2017 and has recently proposed listing applications and forms applicable to companies applying for listing, among other things. *See* Proposed Rule Change to Specify the Required Forms of Listing Application, Agreement and Other Documentation, Exchange Act Release No. 80453 (Apr. 13, 2017), 82 FR 18507 (Apr. 19, 2017); *see also* Proposed Rule Change Related to Continued Listing Standards for Exchange Traded Products, Exchange Act Release No. 80905 (June 12, 2017), 82 FR 27748 (June 16, 2017).

We are deeply concerned that allowing fragmentation of the closing auctions could destabilize the market close. Issuers depend on the established, orderly procedure of today's market close and reliable closing prices. Decentralizing the orders in the closing auctions would radically alter the way exchanges work and would hurt public companies and their investors. Small and midcap firms want and need the primary listing exchange to manage the closing process.

The BZX proposal may help members of BZX save on execution costs, but at the expense of our capital markets. The central question is, do the markets exist to serve the intermediaries or to serve the public companies, their workers, their investors and their retirement savings?

Sincerely,



Ari M. Rubenstein
Co-Founder and Chief Executive Officer
GTS

cc: Jay Clayton, Chairman, U.S. Securities and Exchange Commission
Michael S. Piwowar, Commissioner, U.S. Securities and Exchange Commission
Kara M. Stein, Commissioner, U.S. Securities and Exchange Commission

Written Testimony of Joseph Saluzzi, Partner and Co-Founder, Themis Trading LLC

Before the U. S. House of Representatives Committee on Financial Services

Subcommittee on Capital Markets, Securities, and Investment

Hearing entitled "U.S. Equity Market Structure Part I: A Review of the Evolution of Today's Equity Market Structure and How We Got Here"

June 27, 2017

Introduction

Thank you, Chairman Huizenga, Ranking Member Maloney and members of the Subcommittee, for giving Themis Trading the opportunity to testify on this important topic. We want to applaud the Subcommittee on Capital Markets, Securities, and Investment for taking the time to examine and question the functioning of our modern equity market structure. We believe that having a fair and healthy market that works well for all investors is not a partisan issue.

We have been in a bull market for many years, and volatility is at record lows. Often in such times, when everyone is pleased when they open their brokerage statements, it becomes easy for our industry and regulators to become complacent, and not ask tough questions that should always be asked. Thank you for asking these questions, and thank you for inviting Themis Trading to testify today.

My name is Joseph Saluzzi and I am a partner and co-founder of Themis Trading, a no-conflict institutional agency broker. We do not make markets, and we do not trade proprietarily. We do not own a dark pool. Our only business is providing best execution for our institutional clients; we are agents for long term investors. Our clients are comprised of pension funds, mutual funds, money managers, and hedge funds, and together they represent well over a trillion dollars of long-term investor funds.

My partner, Sal Arnuk, and I started Themis Trading in 2002 to leverage our expertise in navigating the electronic trading landscape. In the 1990s, we navigated an environment in which regulators tried to rectify many problematic features of market structure at the time. NYSE specialists engaged in imperfect activity. Nasdaq market makers colluded in keeping bid-ask spreads artificially wide. In Themis, we hoped to grow a firm that utilized electronic tools to source liquidity for our clients in the cleanest natural ways. We hoped to navigate in ways that minimized the interaction with sub-optimal intermediaries engaging in bad behavior.

By the mid-2000s, we recognized that the "new" equity market structure, with its plethora of ECNs, dark pools, and trading platforms/exchanges, was evolving in especially troubling

ways. Complexity was rapidly increasing. A new breed/evolution of short-term traders were rising – a breed that evolved from what many of you recall as the SOES Bandits. These traders were becoming the dominant form of liquidity in our markets, with business models built around arbitraging faster and slower quotes on different venues. These firms realized that seconds, milliseconds, and now microseconds mattered, and they realized that to capitalize on their proprietary trading arbitrage they needed tools like colocation and special data feeds to engage in this arbitrage dance.

We noticed it was becoming increasingly difficult to navigate the stock exchanges and emerging dark pools in the ways we had in the past. In efforts to improve our trading for our clients, we began investigating under the hood of how the stock market really works. We expressed our concerns to our clients, to our regulators, and to our industry in general. We also began sharing our concerns publicly – with white papers, our Themis Blog, and on social media.

Our first white paper, "Toxic Equity Trading Order Flow on Wall Street" was published in 2008. In 2012, we decided to summarize our findings and published our book "Broken Markets". Sadly, many of the concerns that we highlighted in our book are still a problem today.

Today's stock market is comprised of 13 stock exchanges, close to 40 alternative trading systems also known as dark pools and numerous off-exchange "liquidity providers"who are not regulated with the same disclosure and practices yardstick.

This fragmentation particularly escalated after the SEC passed Regulation NMS in 2005. While the SEC believed Reg NMS would create competition among stock exchanges to provide the best prices for investors, we are certain that they did not anticipate that their regulations would also pervasively result in a high-speed competition to trade against long-term investors. And we hope that the SEC did not think that fragmentation among 13 stock exchanges, 40 something dark pools, and now off-exchange liquidity platforms would be a desired result.

Our modern markets are highly complex. Stock exchanges compete against each other, against broker dark pools, and even against the high-speed traders that also seed liquidity on their venues. Our modern markets require speed - not in and of itself – but the need to be speedier than the next guy. There is a joke about a bear chasing after two men, and one of them tells the other, "why run – we can never outrun the bear." The other replies, "I don't need to outrun the bear; I just need to outrun you."

Simply stated, our modern markets are built on high-speed races around a fragmented web of liquidity. While these markets can be navigated fairly well with appropriate expertise and technology in calm times, we are worried how well they can be navigated, particularly by often slower long-term investors in times of duress.

Twenty years ago, when we still worked at Instinet, the original electronic broker, we were excited in how our firm was leveraging the role of technology to bring natural buyers and sellers

together directly, with less intermediation. Today, technology is instead leveraged to insert the maximum number of intermediaries between natural buyers and sellers, in the above-mentioned web of complexity and fragmentation. There is too little disclosure. Too high a proportion of activity in our markets is from short term proprietary traders "intermediating", and it's often needless. We are concerned that as a result, trading costs are higher than what they should be. This perversion is effectively a tax on long-term investors.

What aids and encourages this high-speed race? And what aids the proliferation of too much unnecessary sub-second intermediation? We have a number of concerns about our current US equity market structure:

The Modern Stock Exchange Model

The role of a public stock exchange has changed in the past twenty years.

- Twenty years ago, there were two main stock exchanges that had the goal of aiding in bringing corporations public, and by matching buyers and sellers in a vibrant and liquid secondary market. Those companies would grow over time, hire workers, generate profits, and wealth would be shared. Today, they list mostly derivative ETFs.
- Twenty years ago, stock exchanges made most of their money with listing fees, and matching trading revenues. Today, the exchanges have recognized that the real money is in selling off faster access to insiders, and selling data and data-related services. This represents a significant portion of their revenue today.
- Twenty years ago, the stock exchanges were less anonymous, and the exchanges and members policed each other, perhaps imperfectly, to deal with bad behavior. More recently, exchanges have helped their largest trading clients with special order types, different connectivity and access, and means to jump the queue.

Quite frankly, exchanges have lost their way. They are no longer impartial referees but instead are now players in the game with a vested interest in the outcome. This change has resulted in the major exchanges receiving fines from the SEC for various infractions over the past five years which include:

June 2012 – NYSE fined $5 million for sending market data to some proprietary customers before sending it to the consolidated public feed.

May 2013 – NASDAQ fined $10 million for system failures during the Facebook IPO.

May 2014 – NYSE fined $4.5 million for various rule violations including lack of documentation for its colocation services, early release of closing auction imbalance information to its floor brokers and failure to execute to execute some order types.

January 2015 – BATS Global Markets fined $14 million for failing to disclose details about certain price sliding order types.

Simply put, stock exchanges are now in the arms business – selling speed and unequal access to the highest bidder.

Stock Exchange Rebates

In 1997, the Island ECN initiated a maker/taker pricing system to grab market share away from other market venues. This maker/taker system, which paid rebates to liquidity providers and charged access fees to liquidity takers, was then copied by most of the stock exchanges and has been embedded in our market structure ever since. Rebates have been used by stock exchanges as a way to incent certain behavior often with the consequences of information leakage. For example, to earn an enhanced rebate on the EDGX stock exchange, retail brokers could elect to add a modifier which would inform subscribers of the EDGX data feed that a retail order has been entered. Knowing that an order is retail is extremely important for professional traders because if it's retail then it must not be institutional. While the retail broker earns extra income from the enhanced rebate, they are allowing information to be leaked to a subset of sophisticated investors.

Rebates also distort routing since many broker algorithms will route first to the venue that pays them the largest rebate but not necessarily gives them the best execution. These routing conflicts could be reduced substantially if rebates were eliminated.

The maker-taker fee schedule is a relic of the past and should be discontinued. Congressman Stephen Lynch recognized the problems with these rebates and in March 2015 and introduced H.R. 1216, the "Maker-Taker Conflict of Interest reform Act of 2015". This bill would require the Securities and Exchange Commission to carry out a pilot program to assess the impact of an alternative to the maker-taker pricing model. More recently, in July 2016, the SEC's Equity Market Structure Advisory Committee (EMSAC) recommended that the SEC undertake a pilot program to adjust the access fee cap under Rule 610. Both of these actions highlight the fact that the stock exchange maker/taker pricing schedule is outdated and in need of reform.

We do believe that exchanges provide a valuable service by helping to match buyers and sellers and deserve to be compensated for this function. However, we believe this function is more like a utility and the rates that are charged should be regulated like a utility. We recommend that exchanges charge a flat rate for both the addition and removal of liquidity from their exchange.

Stock Exchange Proprietary Data Feeds

Stock exchanges have created a very lucrative business with the sale of proprietary data feeds. While this business has been very profitable for them, it has also been the source of information leakage for investors. Exchange data feeds deliver information from all individual

orders placed on that exchange at an extremely high rate of speed for those that are willing to pay for this service.

In December 2010, we published a paper titled "Data Theft on Wall Street" where we uncovered that two exchanges, BATS and NASDAQ, were leaking information on hidden orders that were placed on their exchanges. These exchange data feeds were revealing more information than just the original order, depth of book and trade executions. They were revealing information that could help detect hidden and reserve book orders. We wrote:

> "Every time a trader places an order in certain market centers, whether at the market centers directly, or through a third-party DMA, those market centers are collecting data regarding the trader's order flow. They are supplying the information to HFT's that allows them to track when an investor changes price and how much stock has been accumulated. This information is helping HFT's predict short term price movements. Institutional as well as retail footprints are being detected, and "modus operandi" and trading profiles are being created. Traders believe that their trading strategies are protected, when actually their strategies (personal data) -- including variables such as displayed quantity, time stamp, side, revisions, reserve orders, linked executions, order id numbers, accumulations, number of shares -- are being misappropriated for sale by the market centers."

Individual order information should not be fair game to be made available by the exchanges to the highest bidder. However, we realize that many market participants do not want to rely on the public SIP for their pricing information. Therefore, we think a better alternative is to only allow exchanges to provide order information on an aggregated basis. This is possible and is actually being done today by one exchange (IEX).

The Fragile Thin Crust of Liquidity in Public Markets

In a July 2011 speech titled "The Race to Zero", the Bank of England's Andy Haldane said:

> "HFT liquidity, evident in sharply lower peacetime bid-ask spreads, may be illusory. In wartime, it disappears. This disappearing act, and the resulting liquidity void, is widely
>
> believed to have amplified the price discontinuities evident during the Flash Crash. HFT liquidity proved fickle under stress, as flood turned to drought."

The US equity market is a fragmented web of stock exchanges and dark pools that have speed races embedded within them. This tangled web has helped create a public non-diverse thin crust of liquidity. No longer do we primarily have two deep exchange books of liquidity, with a wide variety of different participants making up the public quote (retail investor, institutional investor, and high speed trader). Instead we have dozens of venues, and the public quote is dominated by mainly the short- term traders. We have seen how these order books act in times of stress; we all can recall the flash crash of 2010, as well as the financial crisis.

We think a healthier market place will be one where we see diverse participation on the public stock exchange order books. Until that happens, in times of market stress, we can expect our modern markets to perform in seriously concerning manners that will undermine investor confidence. We must not repeat the occurrences of 2008-2010.

Dark Pool Behavior

We have been, and in many cases still are, concerned with the operation of numerous broker-operated dark pools. In just the past three years, the SEC has fined the owners of some of these dark pools close to $150 million dollars. Below is a list of these recent actions from the SEC:

December 2016 - Deutsche Bank Securities, $18.5 million
January 2016 - Barclays Capital, $35 million
January 2016, Credit Suisse Securities, $54 million
August 2015 – ITG, $20.3 million
January 2015 - UBS Securities, $14.4 million
July 2014 – LavaFlow, $5 million
June 2014 – Liquidnet, $2 million

It's important to note that this list does not include the millions of dollars in fines that the United States Justice Department also levied against some of these firms. The dark pool actions by the SEC centered around these issues:

- Not disclosing unequal treatment of participants. Creation of special technology for messages to be sent about orders to a subset of HFT firms.
- Catering to high speed traders in order to seed their dark order books with liquidity, and at the same time telling investors that they were protecting them from such predatory traders.
- Operating their own proprietary trading division, undisclosed, in their own dark pools.
- Sharing information about participants, and their trading patterns, with certain high-speed trading firms to maximize their alpha against those traders.

Dark pools were originally designed as a complement to public stock exchanges, so that large institutional investors can trade in larger trade sizes with less price impact for the investors they represent. Today, most are little more than internalizing engines for the parent broker, and tools that aid in generating short term trading alpha for high speed clients at the expense of long term investors.

What Exactly is a Market Maker in Today's Environment?

Today, some high-speed traders do actually serve as a "market maker." They provide two-side liquidity, mostly passively, are disclosed and capitalized well, and are an appropriate evolution of the market maker of yesteryear. In contrast, other high frequency traders have proven to be toxic. They have mastered the art of understanding modern stock market plumbing, so that they provide liquidity when they want to, and not when they are needed. Utilizing technology and stock market perverted practices to cherry pick orders to trade against may be a great trading strategy, but that is not the same thing as being a market maker. These HFT's, who are masquerading as market makers, receive perks – such as enhanced rebates and bona fide market maker short sale locate exemptions. However, they are not required to stabilize markets, and they are not all worthy of the special perks.

While some market makers have embraced their role and have argued for more obligations, many others have argued against these obligations. In a February 2017 SEC comment letter, Virtu Financial, an electronic market maker, reiterated their request for more market maker obligations:

> "In July 2010, we submitted a joint letter advocating for stronger obligations for market makers. We noted in the letter that market maker obligations have not kept pace with the market structure changes. In a separate letter to the Commission in December 2014, we reemphasized the need to contemplate specific obligations for market makers. The situation has not changed in the years since, and market maker obligations continue to vary significantly across market centers. We also expressed our belief that market maker incentives, such as market structure benefits or financial incentives, should be consistent with the risk inherent with truly affirmative quoting and trading obligations."

The fact remains that today's market makers do not have the significant affirmative and negative obligations that existed when human trading dominated. In a September 2010 speech, SEC Chair Schapiro commented on the lack of these obligations:

> "In the old manual market structure, the market participants with the best access to the markets — the specialists on the dominant exchanges — were subject to significant trading obligations that were designed to promote fair and orderly markets and fair treatment of investors. These included affirmative obligations to provide liquidity and to promote price continuity, as well as negative obligations to forego trading in ways that would exacerbate price moves — such as aggressively taking out bids during a price decline and thereby driving prices even lower.
>
> These traditional obligations have fallen by the wayside as the market structure evolved and the traditional specialist role became obsolete. Today, in contrast, the obligations that apply to most registered market makers are minimal. In fact, many very active liquidity providing firms are not registered as market makers, and some active firms are

> not even registered as broker-dealers and thereby fall entirely outside the regime for regulated entities."

In the past, market makers were tasked with supplying liquidity in times of stress. Unfortunately, the numerous flash crashes that we have seen since the adoption of Reg NMS has proven that this liquidity buffer often times disappears when needed most.

Internalizers

In addition to trading fast and arbitraging over 50 trading venues (exchanges and dark pools), many short-term trading firms have also engaged in a business we commonly call "internalizing." These firms purchase order flow from online brokers, and even some institutional brokers, and have a free short-term option to trade against those orders. Generally, but not always, they provide an equivalent price to what can be observed on the public markets. These firms, of course, have a faster view of the markets since most rent space in exchange colocation centers and subscribe to exchange proprietary data feeds. The "equivalent fill" they provide is typically measured against the slower public feed.

The problem with internalization was recently evidenced in a January 2017 SEC action against Citadel Securities where Citadel was fined $22.6 million dollars. The SEC found that "two algorithms used by Citadel Securities did not internalize retail orders at the best price observed nor sought to obtain the best price in the marketplace. These algorithms were triggered when they identified differences in the best prices on market feeds, comparing the SIP feeds to the direct feeds from exchanges. One strategy, known as FastFill, immediately internalized an order at a price that was not the best price for the order that Citadel Securities observed. The other strategy, known as SmartProvide, routed an order to the market that was not priced to obtain immediately the best price that Citadel Securities observed."

There is a lot of inside baseball in this process. How is it acceptable for any broker to sell its client order to a short-term trading firm, specifically geared to be an extra intermediary, scalping a small execution price differential for itself? Why would a short term internalizer pay for an order unless they can generally make money by trading against it? This seems to fly in the face of best execution. The existence of this activity is frankly distasteful.

Additionally, an internalizer, paying for the short-term option to match a public quote – often stale – discourages real liquidity providers – investors – from displaying real bids and offers on the public market. Why would an investor bid 50 cents for a stock, hoping to interact with a seller coming in to sell stock to them at 50 cents, only to have the reward of the execution snatched away by an internalizer? For more information on how a retail investor can protect themselves from this dangerous behavior, we recommending reading "What Every Retail Investor Needs to Know".

Payment for Order Flow and Order Routing

The foundation for fragmentation, the dark pool matching with imperfect disclosures, and the internalizer model mentioned above is the permissibility – and encouragement from our regulators – of Payment For Order Flow (PFOF) which includes stock exchange rebates and payments from market makers to retail brokers.

PFOF creates a whole class of market participants (internalizers) that would not exist without it. PFOF is embedded now in the US stock market model and encourages conflicted order routing and needless complexity. Investor orders are not always routed to the destination that will, for them, maximize liquidity and minimize market price impact. PFOF distorts investor order routing away from where the investor may get the best price, and to where the intermediary can extract the most tax.

Because of PFOF, retail orders rarely make it to a public stock exchange, but rather are siphoned off in the dark by savvy short-term traders. Eliminate PFOF and retail orders will migrate to the public stock exchanges and order books. This will be healthy.

Stock exchange maker-taker pricing and, internalizers paying for first shot at investor orders in an order router matrix, distort routing decisions by brokers, and places them in a conflict between their interests and their client interests.

Academic Studies

We are concerned that many academic studies that focus on US equity market structure are flawed because they do not have the proper data to analyze. Many of these studies still use data from something called the Nasdaq HFT dataset that derives its data from 2008-2009. This data is old and insufficient and should not be the basis of determining answers to questions like "does HFT provide liquidity in times of stress?". We're concerned that proponents of the current equity market structure are touting these academic studies to policy makers without revealing their short comings. To avoid these problems, private researchers should be given more current and granular data to study.

Back in 2013, the CFTC, under the guidance of their chief economist Andrei Kirilenko, began an independent research program which yielded some eye-opening results about the supply of liquidity by high frequency traders. This research program, which sourced trading data from original users, was abruptly shut down by the CFTC after complaints from the CME. We find it curious that a research program which was producing results that questioned the role of HFT's was abruptly shut down at the request of an exchange.

We are also concerned that some of these academic studies are funded by industry participants. For example, in 2013, Professor Charles Jones of Columbia Business School

published a paper titled ""What Do We Know About High Frequency Trading?" which was supported by a grant from Citadel LLC.

For a comprehensive list of fact-based studies and documents regarding high frequency trading, we recommend perusing "High Frequency Trading: A Bibliography of Evidence-Based Research" which was produced by a private investor.

Regulators

Regulators have not kept up with the technological gains of recent years. They will likely never be able to. After the 2010 Flash Crash, the SEC proposed and approved the Consolidated Audit Trail which would give them tools to more accurately identify potentially nefarious trading behavior. Unfortunately, more than seven years after the Flash Crash, the Consolidated Audit Trail has still not been built. The one that is being built will make it difficult to identify end-users and it will not have futures market data. It will not even be able to be used to quickly analyze in real-time the actual events that inspired its creation.

After the May 2010 Flash Crash, it took regulators from the SEC and CFTC almost six months to piece together the events of that day. This delay was unacceptable and unfortunately will likely occur again if we have another major market disruption. The problem is that there is still no surveillance system that consolidates data from the futures and securities markets. We recommend that these two agencies create a permanent task force which could quickly share data in the event of a market disruption.

Regulators are also too often leaving their roles surveilling our markets for employment at private trading firms and conflicted industry participants. This damages investor confidence. If key personnel from the SEC's Trading and Markets, as well as FINRA, have a pattern of going to work for those they are regulating, how can the public feel confident that our regulators and policy makers are protecting long term investors?

Summary

In summary, we have a market built around the race for speed that has created public markets that are too thin and fragile – especially in times of stress. Payment for order flow is an incomprehensible and permissible tax on investors - a conflict of interest that needn't exist. Dark pools have been perverted from their intended purpose of facilitating large block trades, and data feeds have been created and enriched with information that serves to facilitate investor order leakage – yet another tax on investors. According to JPMorgan, only 10% of today's stock market volume is from "fundamental discretionary traders". If most of the stock market volume is coming from machines that try to anticipate when prices will move and then trade ahead of that price move, are stock prices accurate? This is concerning to us, and we hope it is concerning to you.

We have a modern equity market structure that is fragmented, conflicted, and complex, and it would be naturally and competitively less so if only our regulators would enact some common-sense reforms including eliminating payment for order flow, regulating data feeds, and improving order routing disclosure.

Nasdaq

June 27, 2017

Testimony of Thomas Wittman
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Before the
House Financial Services Committee's
Subcommittee on Capital Markets, Securities, and Investment

Thank you Chairman Huizenga and Ranking Member Maloney for the opportunity to testify today on "U.S. Equity Market Structure Part 1: A review of the Evolution of Today's Equity Market Structure and How We Got Here." I applaud the hard work of this Subcommittee over the last several years to help bolster our public markets. As you know Mr. Chairman, Nasdaq recently launched an initiative to promote ideas that we think will enhance the public markets and revitalize the pathway for IPOs and improve the public company experience. This effort is built upon outreach to our customers, including listed companies and market participants, and other experts to produce actionable recommendations for the SEC, Congress and the new Administration. We recently released our proposals to reconstruct the regulatory framework, enhance market structure and promote long-termism and they can be reviewed at: http://business.nasdaq.com/revitalize. We also ask that our Revitalize Blue Print be added to the Committee record as Attachment I in our testimony.

Let me begin by stating a few observations about the U.S. marketplace for equity securities:

1) Our markets are the strongest and fairest capital markets around the globe. They are the envy of the world.
2) U.S. equities are unmatched in liquidity, depth and transparency. We should be careful not to tip the balance. Regulation NMS is not perfect, but it has achieved its intended target of

enhanced competition among exchanges, improved resiliency and lowered the overall cost of trading. Only data driven analysis should underpin potential changes.

3) Self-Regulation remains critical to investors and the US equities market. Investors must have confidence that markets are fair and well-regulated. SROs make a critical contribution to fair and well-regulated markets by investing heavily in state-of-the-art technology and well-trained people dedicated to real-time market surveillance and enforcement. The modern exchange self-regulatory model is a necessary and effective partner to the SEC to add a real-time view and years of regulatory expertise. Without SROs, the SEC would face serious challenges to protect investors and ensures a fair and transparent market is available to all. Without SROs, the SEC would have to grow significantly.

4) The SEC's Equity Market Structure Advisory Committee (EMSAC) does not have listing exchange membership, online retail broker membership or public company membership beyond financial services. This lack of key viewpoints has led to recommendations that are not representative of some of the broader and deeper issues – such as the lack of capital formation.

5) Speaking of capital formation, it is the central issue facing the markets today! The focus of all market structure discussions should be centered on one issue: How do we improve the liquidity and trading experience of small public companies? The trading environment for public companies fails to take into account the size and needs of smaller public companies. Market structure has real, and at times unintended, impact. A small regional bank in your district is expected to attract liquidity and trading volume under the same rules that apply to trading Apple, Google and Amazon. The smallest companies have their trading spread among 12 exchanges and about 40 dark pools. CEOs and CFOs see the trading characteristics of small issues and are dismayed to observe that price discovery is scattered over 50 venues in order to comply with a national standard designed for the trading of billion

dollar plus companies. Simply put, regulation that applies a one-size-fits-all market structure does not serve a diverse set of issuers or investors well.

6) Market Structure is evolving to better serve investors without regulatory or legislative action: For example, the last time Nasdaq testified before this subcommittee, the speed and resilience of market data was discussed often. Since then, Nasdaq has enhanced the Nasdaq Securities Information Processor (SIP) with state-of-the-art technology that simultaneously strengthened resiliency and reduced processing time by over 90 percent, a technological advancement that Nasdaq is especially proud to deliver to the markets. The consolidated data feed is now one of the fastest in the industry; in fact it is faster than several direct markets direct feeds.
7) The duty to provide fair and equal access should be harmonized across all platforms to protect investors from unfair discrimination, avoid two-tiered markets, and unify liquidity that is fragmented across over 50 execution venues. Regulators must consider the structural advantages of off-exchange trading when considering new layers of regulation that could push additional trading off exchanges.

Nasdaq's perspective on market structure is unique; we operate closer to the intersection of capital formation and market structure than any market participant. Across its global exchanges, Nasdaq lists more than 3,700 companies from 35 countries, representing more than $10 trillion in total market value. $10 Trillion dollars is very significant; that is $10 Trillion dollars that not only supports corporations that make jobs around the globe but that also leads to growth in millions of US Citizens savings and retirement accounts. Nasdaq serves issuers through all stages of growth, in all phases of their operations, and on every continent. From liquidity events on the Nasdaq Private Market through initial public offerings and secondary trading to fixed income issuance and

derivatives hedging, Nasdaq lives at the heart of capital allocation. Nasdaq issuers, in turn, are the engine of the U.S. and global economy, spurring innovation, creating jobs, and driving economic growth.

In addition to our role as the owner and operator of 35 markets, clearinghouses in central securities depositories in the U.S. and Europe, we also are the market infrastructure technology supplier to 85 markets, clearinghouses, and regulators, across the globe. Therefore, Nasdaq is uniquely focused on the value of liquidity that is instantaneously accessible to global investors.

For over 400 years, governments and institutions have recognized that well-functioning public markets are the backbone of effective capital formation. Initial public offerings depend upon readily available secondary markets, which in turn depend upon public price discovery and displayed liquidity. Displayed bids and offers, which are immediately accessible help form the public reference price that millions of investors rely on, not only for valuing individual stocks, but also for valuing trillions of dollars of equities exchange traded funds and mutual funds, not to mention the larger pool of options, futures, and other derivatives tied to that reference price. And, for small issuers, that reference price is not being cultivated according to their specific needs.

A key ingredient in our Revitalize Blue Print was enhancing the market structure for small public companies. Our Revitalize recommendations center on items this committee has already considered as part of the Financial CHOICE Act, H.R. 10, which Nasdaq supported publicly and has hopes that the U.S. Senate will use as its guidepost as it crafts its own plan.

Nasdaq

As you will see in our plan, Nasdaq recommends that policy-makers reconstruct the regulatory framework for public companies (through changes to tax policy, litigation policy, reforming the proxy process and ease the burdens of corporate disclosure), modernize securities market structure to help the trading experience of small public companies and promote long-termism to protect a critical sector of investors in our public markets. In many ways, today's markets bear little resemblance to those of just a decade ago. The old images of brokers fielding telephone calls and floor traders hollering orders has long since given way to a profoundly interconnected, technology-driven marketplace that transacts across an astonishing array of exchanges and trading venues. As a pioneer in the development of electronic trading, Nasdaq views market innovation as a tremendous force for good, unlocking competition and unleashing the flow of capital to catalyze economic activity. Yet, as markets have advanced, the fundamental structure that underpins them has not evolved to benefit all market segments equally. While efficient markets benefit both issuers and investors, inefficient markets can choke the flow of capital, become a drain on growth, and block companies—particularly small and medium growth companies—from reaching their fullest potential.

The key regulations that form the foundation of today's markets—including Reg. NMS and Reg. ATS—were developed and implemented more than a decade ago. Despite improvements to markets after implementation of these regulations, liquidity and the trading experience for small and medium growth companies and investors in these companies still lag far behind that of larger issuers. As such, policy makers should be hyper-focused on addressing the one-size-fits-all regulatory regime. For small and medium growth companies—those with a market capitalization below $1 billion, particularly when the lower market cap is accompanied by low daily trading volume— relatively small orders can create dramatic price movements. This increases costs for both the companies and their investors. For example, regardless of the listing market that a company may choose, small and

medium growth companies have shown a worsening incidence of high-volatility days, which increases investor confusion and undermines confidence in our markets.

This liquidity dilemma stems from a long-term trend towards fragmentation, where liquidity has spread across an increasing number of trading venues. As recently as 15 years ago, more than 90% of liquidity was often concentrated in a single exchange with the small remainder spread over an additional eight to ten other exchanges and electronic communications networks. Today, liquidity in small and medium growth companies is spread thinly across fifty or more venues (there are 12 exchanges alone), and no single market controls even 25% of trading. As a result, every venue has a very thin crust of liquidity for small and medium growth companies, a crust that can be broken by a single large order. When the liquidity crust is broken, the order can quickly impact the market's ability to efficiently absorb it, resulting in a poor experience for investors. Compounding that trend, liquidity has also moved off exchanges and onto alternative trading venues, making it more difficult to find latent liquidity. Nearly half of U.S. publicly traded small and medium growth companies have more than 50% of their trading occurring off-exchange, away from the benefits of price formation and transparency offered by U.S. exchanges.

Nasdaq believes concentrating liquidity for small and medium growth companies onto a single exchange will allow investors to better source liquidity. The introduction of Unlisted Trading Privileges (UTP) gave rise to fragmentation, combined with a proliferation of alternative trading systems. In 1975, Congress determined that investors would benefit from greater competition if securities listed on one exchange were available for trading on all other exchanges and in over-the-counter trading venues. In 1998, determining that further steps were necessary to foster competition,

the Securities and Exchange Commission enacted Regulation ATS, which lowered the bar for the launch of alternative trading systems. Advances in technology and further regulatory changes, most notably Regulation NMS, enacted in 2006, then led to an explosion of ATSs and exchanges, culminating in the current environment in which we have 50-plus active trading venues.

While these changes have spurred competition that has brought benefits to larger issuers, they have proven extremely challenging for less liquid companies. When it comes to UTP, the law of diminishing marginal returns applies—and we have far exceeded the point at which the benefit outweighs the costs.

Give issuers choice: To consolidate liquidity and improve trading quality, Nasdaq recommends permitting issuers to choose to trade in an environment with consolidated liquidity. By creating a market for smaller issuers that is voluntary for issuers to join and that is largely exempt from the UTP obligations—subject to key exclusions—we can concentrate liquidity to reduce volatility, preserve choice improve the trading experience, and spur market innovation that supports smaller issuers.

Eliminating UTP for small and medium growth companies would allow liquidity to develop, and for supply and demand to find one another. Without the rigidity of Regulation NMS which was enacted to cater to a UTP market model, the new markets would also create natural opportunities for other market structures to innovate – for example, intraday auctions to bring together supply and demand for the benefit of all. The net effect our recommendations will be a substantial "thickening" of the liquidity crust on the exchange that lists the security.

Nasdaq has learned from experience that for small and medium sized issuers, consolidation offers significant benefits to investors. On Nasdaq's First North market in Sweden, which lists small and medium stocks, liquidity is concentrated on a single market rather than distributed over many markets. When comparing the trading characteristics of the securities on the un-fragmented First North market with the corresponding stocks in the fragmented U.S. markets, spreads are 37% better and volatility is also lower on First North, even though the stocks listed are smaller than those listed in the U.S. In addition to the potential benefits to specific issuers and their investors, consolidation in this segment of the market could reduce the level of complexity arising from the interconnections of multiple exchanges. Furthermore, order types designed specifically to accommodate market fragmentation can be removed, increasing simplicity and decreasing risk.

Reducing fragmentation does not have to come at the cost of reduced resilience. The listing exchange should ensure that a robust backup system is in place—as well as a named backup exchange—to ensure resiliency for the trading of these securities. For example, Nasdaq has a proud history of maintaining resiliency in markets, including robust testing and geographically diverse systems. In sum, these changes would result in a "net" benefit to small and medium growth companies and their investors.

Deploy intelligent tick sizes: Every company listed on U.S. markets trades with the same standard tick sizes, but advancements in technology make this standardization completely unnecessary. Nasdaq's experience and research demonstrates that a one-size-fits-all approach to tick size is suboptimal, particularly small and medium growth companies. Nasdaq believes that these companies

should have the ability to trade on sub-penny, penny, nickel, or even dime increments. Transparent and standardized methodologies can and should be used to accurately determine the optimal tick size to increase liquidity and reduce trading costs. Both Nasdaq and the NYSE petitioned the SEC for this reform many years ago and to date nothing has happened on those petitions.

Implement an intelligent rebate/fee structure that promotes liquidity and avoids market distortions: Over the last decade, technological advancements and competition have dramatically lowered the cost of executing trades. This trend obscures the fact that fees and rebates, particularly rebates, are critically important for listed companies too, and not just a factor for traders. Nasdaq relies on liquidity rebates to motivate market makers to enter aggressive quotations which in turn ensures that price discovery is accurate and reliable. For active securities with strong order flow competition, these rebates may be less material, but for illiquid securities rebates can be critically important to a sound market.

Nasdaq believes that any study that looks at fee or rebate levels must be well-designed to help develop an intelligent fee and rebate regime, which would align with the Intelligent Tick Size regime Nasdaq has long recommended. We firmly believe that a blunt access fee pilot that does not consider the impact on liquidity could harm smaller company stocks that already face liquidity head-winds. Additionally, issuers should be given a choice as to their stock's participation in any pilot that is developed, in recognition of the potential impact to their shares and shareholders. We need to be very careful about policies that would eliminate or significantly reduce liquidity incentives such as rebates in the context of less liquid stocks where the gain or loss of market making will have the most impact.

All market structure policies must emanate from data driven policy analysis. Any reform of our powerful equity markets should be approached prudently. Those calling for reforms must present *compelling* empirical evidence to demonstrate that our world-class system has a problem or problems that need fixing before producing a solution in search of a problem. Reformers must state clear policy goals, and proposed reforms should be closely tied to those policies and designed to avoid harming the markets in unanticipated ways. Any data driven analysis must be accompanied by meaningful reform of the metrics used to evaluate the behaviors and successes of the U.S. Equities Markets. Metrics must evolve with the markets to support ongoing, meaningful disclosure. Investors must be able to easily and accurately assess the performance of their agents, brokers, and exchanges alike; regulators and policy makers must be able to apply meaningful regulatory scrutiny. Today's metrics fall short on both measures. For example, based on Nasdaq's review, Rule 605 reports for three major markets now cover only 29 to 54 percent of total trading activity, and virtually all covered orders fall into a single time-measurement category because the rules' speed measurements are so far out of date.

Therefore, Nasdaq recommends a substantial modernization of Rules 605 and 606 before or at least simultaneous with revisions to other components of the Regulation NMS. Time measurements and quality metrics must be updated to reflect the vast improvements in technology that occurred after the adoption of Regulation NMS. With this enhanced data set, other metrics and analytics could be developed to guide the evolution of market structure while preserving the many benefits investors currently enjoy. The Commission has already released the Order Handling Disclosure proposal which recommends enhancements to Rule 605 and 606. The proposal includes customer-specific disclosures that are designed to enable customers to assess their broker-dealers' services,

including the handling of potential conflicts of interest, risks of information leakage, and best execution. The proposal includes disclosure of fees, rebates, payment for order flow, and other incentives that might impact the execution and routing of orders by broker-dealers and ATSs.

Market participants also need a clearer statement of the Duty of Best Execution. While Best Execution and Rule 611 both ensure order protection, their interaction is not well defined or understood. Rule 611 is the exchange-centric mechanism that ensures that, with limited exceptions, the best-priced orders are executed and not bypassed in favor of orders entered at worse prices. The Duty of Best Execution is the brokers-dealer centric regime administered by FINRA that governs the handling of customer orders and their execution on and off exchanges. The Order Protection Rule more narrowly governs the treatment of displayed quotations of automated market centers within the national market system. Market participants must understand the role Best Execution is intended to play, and how it interacts with the version of Rule 611 that emerges from this debate.

For example, European regulators recently enhanced and clarified the equivalent Duty of Best Execution under MiFID II, Article 27. MiFID II establishes a new standard requiring brokers to take "all sufficient steps" to achieve the best possible results for clients. In addition, policy makers enumerated and clarified multiple factors brokers must evaluate when attempting to comply with the new standard, including speed, price, costs, settlement, size, and many others. Such restatement and modernization is highly beneficial to investors and market professionals.

Once metrics are in place and the Duty of Best Execution is modernized, Nasdaq could support an access fee pilot provided that it is well constructed and properly adopted. In adopting Regulation

NMS, particularly Rules 610 and 611, the Commission was concerned that imposing strong order protection necessitated a corresponding cap on access fees, lest venues with protected quotes raise access fees unreasonably. Since 2005, competition for order flow has further constrained access fees, and increased the use of rebates as incentives for displaying liquidity. Thus, high access fees generally persist only where accompanied by high rebates, and the highest access fees correlate strongly with the highest rebates. Since transactions always involve both an access fee and a fee rebate, the issue of access fees is not about gross fee revenue but access fee revenue net of rebates.

The questions then become whether the combination of fees and rebates supports or undermines public policy goals, such as the promoting the display of liquidity, protecting orders, or protecting investors. These questions have broad implications for any proposed access fee pilot. First, if the Commission were to eliminate the Order Protection Rule (which Nasdaq opposes), there becomes no justification for Commission-determined fee cap. Likewise, if the Commission were simply to weaken the Order Protection Rule, the justification for a fee cap would also be weakened.

Second, as discussed earlier, the pilot should study the impact on issuers of liquidity rebates. Limiting fees is an ineffective way to study the impact pricing models would have on liquidity and on issuers; it would be wrong to assume that capping fees would effectively illustrate the most suitable liquidity incentives for issuers that need them most. A well-designed study might also be useful in assessing the impact of rebates on locked markets behavior, also a regular topic of discussion. Technological limitations that once supported the rule against locked and crossed markets no longer exist. The Commission could consider studying both liquidity rebates and also a relaxation of that prohibition, at least for some groups of securities if not all. Third, the pilot should harmonize the fees and incentives permitted in both on-exchange and off-exchange trading to maintain a healthy balance of Exchange and OTC trading. Access fees and rebates are each a component of that

balance. Limiting fees and rebates on one segment of the market could tilt trading into the other. This could result in a higher percentage of orders executing in venues that are not required to provide fair and equal access under Regulation NMS, or to comply with the resiliency requirements of Regulation SCI.

Putting aside the relative merits and drawbacks of the current system of access fees and rebates, it is clear that the one-size-fits-all approach is sub-optimal. The interplay among access fees, liquidity rebates, minimum tick increments and the locked/crossed markets rule impacts different stocks differently, and is particularly detrimental for low-priced, low-liquidity stocks

Markets and market structure are interconnected: In Nasdaq's experience, the building blocks of market structure are fundamentally interconnected; they cannot be separated and they cannot be examined in isolation. Nasdaq, therefore, supports only a broad and integrated approach to market structure revisions, one that re-examines all related elements and that analyzes the costs and benefits of changing one element, and the ways in which that change may affect other elements.

Establish regulatory harmony to protect more investors. Investor orders should be equally and well protection wherever executed. The Commission must explain why the 60 percent of orders are executed on exchanges merit a higher level of protection than the 40 percent of orders that are executed off exchange. In times of stress or crisis, the Commission naturally turns to exchanges add safety nets and protections; circuit breakers, limit-up-limit-down, Reg SCI, Reg SHO and many other regulations rely disproportionately on exchange effort. Investors would be better served by a unified regulatory model

that treats multi-lateral trading systems according to their function rather than their status, the approach taken by European regulators under MiFID II.

The duty to provide fair and equal access should be harmonized across platforms to protect investors from unfair discrimination, eliminate burgeoning elements of a two-tiered market, and unify liquidity that is fragmented across over 50 execution venues. Permitting execution venues to capture significant liquidity for the benefit of a select few can no longer be justified as sound policy, any more than can the unfettered ability to segment prices by some execution venues and not others. Can policy makers continue to ignore the reality that off-exchange payment for order flow has the same economic impact as exchange rebates in determining where orders are touted and ultimately executed? Investors deserve at least the same visibility into fees and rebates on and off exchange, to promote not only fairness but also competition.

One Size Does Not Fit All. Well-functioning markets require a mix of markets, participants, issuers, and investors. The system must accommodate passive investing, high frequency trading, and business models in between. Rational regulations must simultaneously preserve the value of Exchange and OTC liquidity, maintain an appropriate balance between them, and limit regulatory arbitrage that harms investors. And, perhaps most importantly, the markets must work effectively for all issuers, from a market capitalization of $50 million to $750 billion; from average daily share volume of 50,000 to 50 million; from start-up to a centuries-old mature company.

Conclusion: The U.S. equities markets are the envy of the world because they are singularly effective at attracting and allocating capital to innovative companies that create millions of jobs and trillions of dollars of shareholder value, companies like Apple, Google, Facebook, Amazon, Cisco

Systems, Gilead, and thousands of other Nasdaq issuers. We believe Congress could enhance the experience in the marketplace and restore the attractiveness of our capital markets if the policy debate centered on:

1) Revoking unlisted trading privileges (UTP) for small and medium size company shares to allow more concentration of the liquidity in the market – giving the company some choice over the market structure in which they would be subjected.
2) Adopt Intelligent Tick sizes that will allow companies to trade in the most efficient and liquid manner.
3) And, approach the rebate discussion with the liquidity needs of the smallest issues in mind and approach the other end of the debate with data driven facts. Our markets are too important to job creation and economic vitality to take unjustified risks to the system.
4) Protect issuers and investors from increasing fragmentation in the market by requiring fair and equal access on all trading platforms.

We look forward to working with the Subcommittee on these important issues and appreciate the opportunity to present our views.

THE U.S. EQUITY MARKETS

A Plan for Regulatory Reform

July 2016

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COMMITTEE ON CAPITAL MARKETS REGULATION

The Committee on Capital Markets Regulation is an independent and nonpartisan 501(c)(3) research organization dedicated to improving the regulation of U.S. capital markets. Thirty-four leaders from the investor community, business, finance, law, accounting, and academia comprise the Committee's membership.

The Committee Co-Chairs are R. Glenn Hubbard, Dean of Columbia Business School and John L. Thornton, Chairman of the Brookings Institution. The Committee's President and Director is Hal S. Scott, Nomura Professor and Director of the Program on International Financial Systems at Harvard Law School. The Committee's research on the regulation of U.S. capital markets provides policymakers with a nonpartisan, empirical foundation for public policy.

Unless otherwise noted, the recommendations in this Report are unanimously supported by Committee members, though some statements expressed in the body of the Report may not be shared by all members. The Report represents the work of the Committee, not the institutions of which its members are a part.

The Committee wishes to thank all of the members of the Advisory Committee for their extensive and valuable input on the critical issues examined in this Report. In addition, we wish to thank the entire staff, and in particular John Gulliver, the Research Director, who guided this project from start to finish, Megan Vasios, our current associate, who helped throughout, and Matthew Judell, a former associate, who did much of the original data analysis in Chapter 1.

A Path Forward for the U.S. Equity Market Structure

Well-functioning trading markets for stocks are critical to the U.S. economy because they promote the productive allocation of capital. They do so by establishing accurate prices for the shares of publicly traded companies and by enabling investors to efficiently enter and exit their investments. However, in recent years, a lack of understanding of our trading markets has fostered concerns that the markets are not functioning effectively for long-term investors. Some critics have even gone so far as to suggest that the equity markets are "rigged" against long-term investors.

"*The US Equity Markets: A Plan for Regulatory Reform*" ("**the Report**") addresses these concerns in two distinct ways. First, we seek to inform the public and policymakers about the U.S. equity market structure and evaluate its performance for U.S. investors and public companies. Second, we set forth twenty-six recommendations to enhance the performance of our equity markets. We note that the Securities and Exchange Commission ("**SEC**") has the authority to implement all of our recommendations except for three that would require legislative change. These three recommendations are noted with an asterisk in the list below.

To inform the public about our trading markets, we have conducted an empirical analysis of U.S. stock orders and executions over the past twenty years. This research allows us to reach conclusions as to how investors and public companies are faring in today's markets. Overall, we find that our trading markets are performing very well for long-term investors. For example, we find that our markets are highly liquid and that investor transaction costs, as measured by bid-ask spreads, brokerage commissions and price impact, are at record lows. Additionally, instances of extreme volatility have been infrequent and isolated, and can be addressed by our recommendations.

We also explain high frequency trading ("**HFT**") strategies and "dark pools" and we review the academic literature on each. With regards to HFT strategies, we believe that they are best understood as modern variants of traditional market making and arbitrage strategies that have always existed in equity markets. These

strategies can provide important benefits to markets—market making provides investors with liquidity and arbitrage improves the accuracy of stock prices. Our review of the academic literature on HFT strategies finds that they are generally associated with positive effects on market quality, particularly with respect to liquidity, price efficiency, and volatility.

With regards to orders that are executed in the "dark," we find that dark orders are often executed at a better price than the best publicly displayed price. However, our review of the academic literature on the relationship between dark trading and market quality is inconclusive. A number of studies find positive effects from dark trading, such as lower transaction costs, while several others find that dark trading can have negative effects, including a reduction in the accuracy of stock prices.

We also explain the key rules that govern trading in the U.S. stock market and their policy goals. These rules were last comprehensively revised over a decade ago and since then, our equity markets have dramatically changed. We explain how.

Our recommendations to modernize the existing equity market structure rules are based on three underlying themes: (1) Increase transparency; (2) Strengthen resiliency; and (3) Lower transaction costs by enhancing competition. A list dividing our twenty-six recommendations into these three themes is included at the end of this statement.

We hope that dividing our recommendations into these three groups will clarify the order in which policymakers should address our recommendations. Indeed, we strongly suggest that the SEC *promptly* acts on our recommendations to: (1) Increase transparency and (2) Strengthen resiliency. We believe that the benefits of these reforms to investors and public companies are clear and significant. Furthermore, these reforms should face limited opposition, in part because they do not affect the existing competitive balance between exchanges and broker-dealers.

More specifically, the disclosure rules that apply to our equity markets are severely outdated, as they were implemented in 2000 when stocks primarily traded on the floor of an exchange. Enhanced disclosures by exchanges and "dark pools" would allow brokers to better identify the trading venues with the best prices. This will put more money in the pockets of investors, because brokers retain significant discretion about where they will send and execute a customer's order. Brokers should also be subject to enhanced disclosure requirements so institutional and retail investors can determine whether their broker is getting the best prices for their orders.

Strengthening the resiliency of U.S. equity markets would also improve investor confidence by reducing the likelihood of events like the May 6, 2010 "flash crash" or the volatility seen on August 24, 2015 (when hundreds of stocks did not open on time, were subject to multiple trading halts after opening and traded at highly volatile prices). Indeed, most of the existing volatility controls are relatively new, and recent events have provided us with the information that we need to enhance them.

Finally, we expect that our recommendations to lower transaction costs by enhancing competition will be our most contentious recommendations. This is because certain of these recommendations are based on the view that stock exchanges have authorities that reduce competition and increase transaction costs for investors. We therefore recommend that the SEC take incremental steps when possible. The use of pilot programs and independent studies could be especially valuable to ensure that these reforms have a solid analytical basis. Such an approach would promote both the effectiveness of the reforms and the legitimacy of the SEC's actions.

In conclusion, it is our strong view that now is the time for policymakers to act in the best interest of long-term investors and public companies by unleashing the benefits of transparent, resilient and competitive equity markets.

CCMR Specific Recommendations[1]

(1) Increasing the Transparency of our Equity Markets

1. The SEC should require that disclosures on new Form ATS-N are published in a standardized format.

2. Required disclosures of registered exchanges should be revised to include trading volumes attributable to undisplayed ("dark") order flow.

3. Retail brokerages should be required to provide disclosures regarding execution quality for their customers. Relevant disclosures should include percent of shares with price improvement, effective/quoted spread ratio, and average price improvement.

4. The SEC should require broker-dealers to provide institutional customers with standardized reports that provide order routing and execution quality statistics.

5. Trading venue disclosures should include information about execution speeds to the millisecond.

6. Statistical information for disclosures pursuant to Rule 605 and Rule 606 and disclosures regarding institutional orders should be submitted in only one format to facilitate comparison across trading venues and among broker-dealers.

7. The SEC's cost benefit analysis for the Consolidated Audit Trail did not determine whether the $2 billion in implementation costs and $1.5 billion in

[1] The below list divides our recommendations into three groups. We note, however, that the Report does not present our recommendations in these same groupings. This is because the order of the report is based on our explanation of the existing rules and not the themes underlying our recommendations.

annual reporting costs for broker-dealers would be passed on to investors. Prior to finalizing the CAT, the SEC should conduct a *publicly available* analysis that evaluates the costs and benefits of the CAT, and applies the cost benefit analysis to ensure that the CAT is implemented efficiently, with costs allocated appropriately amongst the stakeholders.

8. The SEC should pass a rule applying the order protection rule to odd lot transactions above a threshold dollar amount, instead of a threshold share amount.

9. Broker-dealers should be required to disclose how access fees and liquidity rebates affect order routing practices and transaction costs for their customers.

10. The SEC should require exchanges to publicly disclose revenues from the securities information processors (**"SIPs"**), the allocation of market data revenues among SIP Plan Participants and revenues from proprietary data feeds.

11. The SEC should require exchanges to disclose performance data for the SIPs and proprietary data feeds to facilitate a comparison of the relative speeds with which investors can obtain actionable market data from each.

(2) Strengthening the Resiliency of our Equity Markets

1. Thresholds for market-wide circuit breakers should be adjusted so that they are triggered when a pre-determined number of stocks or percentage of an index display extreme volatility by triggering their individual trading halts.

2. The SEC and the Commodity Futures Trading Commission should work together to harmonize the thresholds for market-wide circuit breakers in the stock market with the futures market.

3. The SEC should establish uniform Limit Up-Limit Down (**"LULD"**) intraday price bands, instead of wider bands during the market open and close.

4. The SEC should eliminate clearly erroneous trade guidelines by aligning them with the thresholds for LULD rules.

5. The SEC should require mandatory kill switches on all exchanges for all exchange members.

6. The SEC should clarify exchange regulatory trading halt procedures in the event of specific operational failures (e.g., SIP failure).

(3) Reducing Transaction Costs by Enhancing Competition

1. The surveillance and enforcement regulatory responsibilities currently assigned to SROs should be centralized to the extent practicable. The reorganization could include centralization at either the SEC or FINRA.*

2. The NMS Plan process should be revised so that exchange SROs do not have outsize influence in the rulemaking process. Representatives of exchanges, broker-dealers and investors should be permitted to vote on any NMS Plans.*

3. Once SRO surveillance and enforcement responsibilities have been centralized to the extent practicable, Congress should revisit the Exchange Act to reconsider exchange legal immunity. Exchange legal immunity should only be available for exchange regulatory functions unique to exchanges that cannot be effectively centralized.*

4. The SEC should implement a pilot program to evaluate the impact of a reduction in access fees and liquidity rebates on market quality and trading behavior. The structure of the pilot should generally conform to the

framework proposed by the Equity Market Structure Advisory Committee Regulation NMS Subcommittee and leverage existing pilots as appropriate.[2]

5. After concluding the access fee pilot, the SEC should conduct a pilot program for reducing the tick size for highly liquid stocks. The pilot should include a control group and should not include a trade-at rule.

6. After requiring disclosure of exchange market data revenues, the SEC should adopt a "Competing Consolidator" model for data dissemination. As a first step to implementing this framework, the SEC should promote reforms in the governance and transparency of the current SIPs.

7. The SEC should *not* implement a trade-at rule, as it could increase investor transaction costs without appreciably improving market quality.

8. ATSs should be allowed to limit access to their trading venues.[3]

9. ATSs should not be required to obtain pre-approval from the SEC before adopting trading rules.

[2] Citadel dissents from this recommendation.
[3] Citadel dissents from this recommendation.

EXECUTIVE SUMMARY

This Report is divided into four chapters: Chapter 1: Market Characteristics and High Frequency Trading; Chapter 2: Trading Venues and Undisplayed Liquidity; Chapter 3: Regulation National Market System (**"Reg NMS"**); and Chapter 4: Understanding and Enhancing Market Resiliency.

Chapter 1 sets forth the findings of our empirical analysis of equity quotation and execution data over the past 20 years. The analysis considers key market performance metrics to reach empirically-based conclusions regarding the impact of the automated market structure on investor outcomes. The chapter then provides specific insight into high frequency trading (**"HFT"**) strategies, including a simple example of an HFT strategy and a review of the academic literature on HFT strategies and market quality.

Chapter 2 describes the rules applicable to the two types of trading venues: exchanges and alternative trading systems (**"ATSs"**). It also describes the process of broker-dealer internalization. The chapter then sets forth proposed reforms to exchanges and ATSs. Next, the chapter describes undisplayed or "dark" liquidity, including a review of the academic literature on the relationship between "dark" liquidity and market quality. The chapter then sets forth specific recommendations related to "dark" liquidity.

Chapter 3 is divided into four parts, each of which addresses a major rule from Reg NMS: the order protection rule, the access rule, the sub-penny rule and market data rules. Each part explains the policy goals underlying each rule and sets forth specific recommendations for how to better achieve those policy goals.

Chapter 4 explains the 2010 flash crash, the market break of 1987 and the disruptions experienced on August 24, 2015. The chapter then describes existing volatility controls and sets forth specific recommendations for how to strengthen the resiliency of our equity markets.

INTRODUCTION

From the 1970s until the mid-2000s, the U.S. equity markets were dominated by exchange-based floor trading. This manual market landscape had some marked differences from the modern structure. For example, trading was highly centralized and competition among trading venues was limited. At the same time, there are similarities between the manual and modern market structure, such as the existence of undisplayed or "dark" trading and broker-dealer internalization.

Once automated electronic communication systems developed in the late 1990s, broker-dealers began to use these technologies to implement trading systems that challenged the dominance of the exchange-based manual model. In 1998, the SEC adopted Regulation Alternative Trading Systems (**"Reg ATS"**), subjecting these trading venues to regulation.

Despite the advent of electronic marketplaces, certain regulations that were in place until 2006 gave a competitive advantage to slower manual markets for exchange-listed stocks. In 2006, the implementation of Regulation National Market System (**"Reg NMS"**) reshaped the equity market regulatory structure to spur the automation of equity markets and lower investor transaction costs. Shortly thereafter, competition among trading venues intensified.

According to Mary Jo White, the Chair of the SEC, "empirical evidence shows that investors are doing better in today's algorithmic marketplace than they did in the old manual markets." However, a number of concerns with our trading markets have emerged in recent years. For example, the proliferation of trading venues means that investor orders may be executed across multiple platforms with different rules. Thus, in certain ways, investors lack transparency regarding where and how their trades are executed, as compared to the highly centralized manual markets. The emergence of HFT strategies that are not well understood contributes to concerns that these short-term trading strategies may be profiting at the expense of long-term investors. Concerns about resiliency have also been raised in recent years, in light of several recent incidents in which technical glitches and human errors caused widespread market disruption.

As detailed throughout this report, the SEC has made considerable progress in enhancing the regulatory landscape. However, there is more work to be done. Concerns related to transparency and equity market resiliency can negatively affect investor confidence and participation in U.S. equity markets, which in turn could make it costlier for public companies to raise capital and for U.S. savers to invest.

Through this Report, the Committee seeks to contribute to the equity market reform effort in two distinct ways. First, we seek to educate the public and policymakers about the U.S. equity market structure and its performance for public companies and U.S. investors. Second, we offer twenty-six recommendations to enhance the existing regulatory framework.

CHAPTER 1: MARKET CHARACTERISTICS AND HIGH FREQUENCY TRADING

Part I: Equity Market Characteristics

A. Competition

We begin Chapter 1 with an analysis of the effect of competition on the distribution of trading volumes among different trading venues. We find evidence of increased competition in (1) the decline in trading venues' respective market shares of total trading volume and (2) the NYSE's decline in market share of trading volume in NYSE-listed stocks.

B. Automation

We then assess the changes to equity market structure that automation has facilitated and amplified. We find that automation is associated with: (1) increased NYSE execution speeds; (2) the emergence of innovative new securities products like ETFs and ETNs, (3) a growth in daily trading volume in NMS securities, and (4) the ability of market participants to update their quotes with greater frequency. We also find that increases in trading volumes and quotes per trade have plateaued or diminished slightly in recent years, which we tentatively attribute to the high degree of competition among market participants that employ HFT strategies.

C. Volatility

Volatility generally refers to the extent to which a stock's price fluctuates over a period of time. A common concern with automation is the belief that it has contributed to an increase in stock market volatility. We review long-term and intraday volatility measures since 2000. We find that the VIX, a commonly used indicator of long-term volatility, is at historically average levels. We find that the intraday volatility for the most volatile stocks and stocks of median volatility is currently lower than its level in 2000 and that the intraday volatility of the least volatile stocks has remained relatively constant since 2000.

D. Liquidity and Transaction Costs

Market liquidity measures the ease with which a security can be bought and sold. Liquidity can be evaluated along three dimensions: (1) *market depth* – the dollar amount or share volume of publicly displayed offers to buy or sell at the best available price; (2) *immediacy* – how quickly trades of a given size can be executed; and (3) *market breadth* – the transaction cost of executing a trade of a given size.

We examine market depth and also treat it as a loose proxy for immediacy, because market depth and immediacy are closely related concepts and empirical trends in market depth are likely accompanied by similar trends in immediacy. We find that the share volume of displayed quotes at the best publicly displayed price (**"NBBO"**) has generally increased or remained stable since 2003.

Market breadth is closely related to a stock's bid-ask spread (the difference between the market prices to buy and sell) because the spread is a component of a trade's cost. We find that in recent years, stocks' spreads at the NBBO have generally fallen for stocks. Lower spreads generally mean lower transaction costs. We also review empirical studies finding that other key components of market breadth have declined. For example, studies have documented a decline in retail and institutional brokerage commissions, and reduced costs associated with price impact for institutional investors.

E. Undisplayed or "Dark" Liquidity

Undisplayed or "dark" liquidity generally refers to trades that are executed without the public display of an order. Trading in the dark can be beneficial to investors when it results in trades being executed at better prices than the NBBO (referred to as "price improvement"). Even if a trade is executed without price improvement, trading in the "dark" can still benefit institutional investors if it helps minimize the price impact of a large order. We review trading venue Rule 605 disclosures and find that exchanges, ATSs, and broker-dealer internalizers each offer measurable price improvement for trades that are executed in the dark. Chapter 2 of this report further describes and contextualizes dark trading in today's equity markets.

Part II: High Frequency Trading Strategies and Equity Market Quality

A. Description of High Frequency Trading Strategies

High frequency trading (**"HFT"**) strategies make up a significant segment of trading activity in the modern equity markets (nearly 50% of U.S. equity market trading volume, according to some estimates). However, in today's markets, high speed execution and data services are accessible to a wide range of market participants, and many different types of institutions and traders use these services. We therefore believe that an informed analysis of the role of HFT in U.S. equity markets should focus on identifying the functional characteristics of HFT strategies, rather than classifying certain institutions that engage in such strategies as "HFT firms." Common functional characteristics of HFT strategies include: (1) use of high speed programs to generate, route, and execute orders; (2) use of high speed execution services and proprietary data feeds offered by exchanges; and (3) short timeframes for establishing and liquidating positions.

Two common types of HFT strategies are HFT market making and HFT arbitrage strategies. Market making and arbitrage strategies are traditional trading strategies that have always existed in equities markets, and HFT strategies use automation to execute these strategies more efficiently.

B. HFT Strategies and Equity Market Quality

To conclude the chapter, we present the results of our independent review of the academic literature that has emerged in the past five years regarding the relationship between HFT strategies and market quality. We find that this literature generally highlights a positive association between HFT strategies and market quality, particularly with respect to volatility, price efficiency, liquidity, and transaction costs. We also briefly introduce certain popular criticisms of HFT strategies and relate these criticisms to illustrative empirical data, finding that there is often a disconnect.

CHAPTER 2: TRADING VENUES AND UNDISPLAYED LIQUIDITY

Part I: Regulating Different Types of Trading Venues

A. Exchanges

Twelve exchanges are currently in operation. They are estimated to collectively handle approximately 63% of the total U.S. share volume of executions in equities. In addition, the SEC approved the exchange application of Investors Exchange (**"IEX"**) in June 2016.

The key requirements that apply to exchanges are set forth in the Exchange Act and in regulations promulgated thereunder by the SEC. One requirement is that exchanges must permit any registered broker-dealer in good standing to become a member of the exchange. Exchanges must also file their proposed rules, which cover trading at the exchange and member conduct, for public comment and SEC approval before they can go into effect. In addition, exchanges are the only trading venues that are statutorily deemed "self-regulatory organizations" (**"SROs"**). As SROs, exchanges must have the capacity to carry out the purposes of the Exchange Act and to enforce compliance by their members with the Act and related exchange rules.

Exchange registration also provides trading venues with certain advantages to other trading venues. These advantages include the ability to display "protected quotes" and several benefits of SRO status (e.g., participation in market data

revenues, design of "national market system plans" (**"NMS Plans"**) that govern the development and operation of major components of the market infrastructure, and certain types of legal immunity). Each of these advantages is explained in detail in the body of the Report.

B. Alternative Trading Systems (ATSs)

In 1998, the SEC passed Regulation Alternative Trading System (**"Reg ATS"**) and established a new type of trading venue, the ATS. This new type of trading venue was designed to respond to the proliferation of automated trading platforms that market participants had developed in recent years, which "furnish[ed] services traditionally provided solely by registered exchanges." There are now roughly forty ATSs that are estimated to collectively execute approximately 15% of the total U.S. share volume in equities.

Although these electronic venues meet the Exchange Act definition of exchange, Reg ATS exempts them from exchange registration if they comply with Reg ATS and their operators are regulated as broker-dealers. However, any venue registering as an ATS cannot exercise self-regulatory powers, such as making rules regarding subscriber conduct outside the platform. For example, Reg ATS requires that an ATS's rules can only pertain to its subscribers' trading conduct, and ATSs can only discipline subscribers by excluding them from trading.

Unlike an exchange, an ATS can effect trading rules without the SEC's pre-approval. ATSs can also limit access to trading on their platform, unless their average daily trading volume in a particular stock equals or exceeds a specified threshold. If that volume is reached, then the ATS must establish written standards for granting open access to trading in that stock and not unreasonably limit anyone's access to trading in that stock by applying those standards in an unfair or discriminatory way.

ATSs are also not required to publicly display orders, unless their trading volume in a stock equals or exceeds a specified threshold *and* the ATS displays prices to more than one of its participants (i.e., it is not a "dark pool"). If an ATS is

a dark pool, then there is no regulatory threshold at which the ATS must publicly display orders. It is important to note that virtually all ATSs are dark pools.

C. Broker-Dealer Internalization

Broker-dealer internalization generally involves a broker-dealer executing customer orders against its own inventory of stocks. Broker-dealer internalizers do not meet the Exchange Act definition of an exchange, because they generally execute trades as principal rather than acting as an intermediary that connects buyers with sellers of stocks. Accordingly, they do not have to register as an exchange under the Exchange Act or an ATS under Reg ATS. Instead, broker-dealer internalizers must register as members of the Financial Industry Regulatory Authority (**"FINRA"**). FINRA membership carries with it a number of regulatory obligations, such as examination, licensing, and reporting requirements. Approximately 22% of the total U.S. share volume in equities is executed in this manner and roughly 250 broker-dealers internalize customer orders.

Nearly 100% of retail orders to buy or sell NMS stocks at the NBBO (**"marketable orders"**) are executed via "retail" broker-dealer internalization. Retail broker-dealer internalizers often have payment for order flow (**"PFOF"**) agreements with retail brokerages. Under a typical PFOF agreement, a broker-dealer internalizer pays a retail brokerage to direct marketable retail order flow to the broker-dealer internalizer for execution. PFOF agreements often guarantee a specified amount of average price improvement for executions of the retail order flow, and the cost savings are generally divided among the broker-dealer internalizer, retail brokerage, and investor. Rule 606 of Reg NMS requires retail brokerages to report information about their PFOF arrangements in quarterly public filings.

D. Different Regulatory Regimes for Exchanges and ATSs

In this section, we consider whether specific differences between the regulatory regimes for the two types of trading venues (exchanges and ATSs), remain appropriate. First, we contrast each venue's access rules. In general, exchanges are required to provide all broker-dealers in good standing with access to trading on their platforms. In contrast, ATSs may limit access to trading on their

platforms. In our view, ATSs' ability to offer price improvement to the NBBO may relate to their ability to limit access to their platform. First, it allows them to quickly limit the access of traders who create a hostile trading environment for other subscribers. Second, certain execution strategies for investor orders may be more efficiently deployed on a trading venue that only includes a specific sub-set of market participants.

Specific Recommendation:

1. ATSs should be allowed to limit access to their trading venues.[4]

We next assess the differences in rulemaking processes and requirements for exchanges and ATSs. As SROs, exchanges have robust rulemaking and self-disciplinary authorities. Rules proposed by exchanges must generally be reviewed and approved by the SEC before they go into effect, and they must be published with an opportunity for interested parties to comment. In contrast, ATS rules are filed only as "notice" to the SEC—they do not need to be published or pre-approved—and they generally address technical aspects of the platforms' operations. We believe that each venue's respective rulemaking requirements are appropriate for two major reasons. First, the required rulemaking process for each type of venue tracks the scope of its rulemaking authority: exchanges have broad rulemaking authority over their members and must abide by stringent rulemaking requirements, while ATSs have narrower rulemaking powers and a streamlined rulemaking process. Second, ATSs' rulemaking flexibility can facilitate innovation and reduce start-up costs for new venues.

Specific Recommendation:

2. ATSs should not be required to obtain pre-approval from the SEC before adopting trading rules.

[4] Citadel dissents from this recommendation.

E. Legal Issues regarding Exchanges and ATSs: Enhancing the Regulatory Framework

Since 2011, several enforcement actions have exposed improper trading and disclosure practices at certain ATSs. These behaviors include (i) the misuse of confidential customer information, (ii) false and/or incomplete disclosures, and (iii) pricing misconduct. We believe that the amendments to Reg ATS proposed by the SEC in November 2015 represent an important step towards improving ATS accountability through enhanced transparency. The proposed amendments would subject ATSs to enhanced reporting requirements on a new mandatory "Form ATS-N." Required disclosures would include information regarding ATS products and services, trading activity by the operators, and procedures regarding confidential customer information. Importantly, Forms ATS-N filed by ATSs would be *publicly available*. We generally support Form ATS-N and believe that these enhanced public disclosures would improve investors' ability to objectively compare trading venues and help reduce the behaviors that led to recent enforcement actions. In addition, we recommend that the SEC provide a mandatory standardized format for Form ATS-N disclosures, to ensure that investors can objectively compare trading venues using the information provided.

Specific Recommendation:

3. The SEC should require that disclosures on new Form ATS-N are published in a standardized format.

Exchanges and "national securities associations" are designated as SROs under the Exchange Act. The only national securities association is FINRA, an independent organization that regulates the securities industry. In practice, exchanges do not execute their SRO obligations independently. The SEC maintains a role in regulating exchanges—exchange rules and disciplinary decisions are subject to SEC review, and the SEC may "suspend, bar or otherwise censure" an SRO that fails in its self-regulatory responsibilities. The Exchange Act also allows the SEC to re-allocate regulatory responsibilities among SROs that would otherwise share those same responsibilities, so that one SRO (e.g., FINRA) can handle those responsibilities on behalf of other SROs (e.g., exchanges). In

addition, SROs have voluntarily entered into Regulatory Services Agreements (**"RSAs"**) with other SROs to contract out certain non-common regulatory responsibilities. The upshot of this ability to outsource SRO obligations is that FINRA now handles many of exchanges' self-regulatory responsibilities on their behalf.

Against this backdrop, we consider the potential benefits of formally centralizing SRO surveillance and enforcement authorities with a single centralized regulator. We believe that this structure could enhance regulators' ability to monitor trading practices across the fragmented marketplace and streamline and simplify disciplinary processes. One option is to centralize these authorities with FINRA, given its existing status as a non-exchange SRO and involvement in discharging SRO responsibilities. Another potential approach is for Congress to consolidate the relevant authorities at the SEC, but only if adequate funding is available to the agency. Competitive private sector alternatives to FINRA and the SEC are also worth evaluating. In principle, centralizing and standardizing these authorities to the extent possible is a worthwhile policy goal that warrants further study.

Specific Recommendation:

4. The surveillance and enforcement regulatory responsibilities currently assigned to SROs should be centralized to the extent practicable. The reorganization could include centralization at either the SEC or FINRA.

One consequence of exchanges' SRO status is that they are able to exert disproportionate influence in establishing market-wide rules through NMS Plans. SROs' authority to file NMS Plans originates in the Exchange Act, which allows the SEC to delegate the development and operation of key elements of market infrastructure to the SROs when they jointly file such plans. The Exchange Act and Reg NMS do not expressly restrict the scope or contents of NMS Plans, so they can govern a wide range of important market structure issues. As a result, their contents affect essentially every market participant, although non-exchange participants play no meaningful role in their design. For example, the consolidated audit trail (**"CAT"**), the tick-size pilot program, and the governance of the

consolidated market data aggregators (SIPs) are all managed according to NMS Plans.

We believe that this system is outdated and unfair in today's competitive marketplace and we agree generally with the approach recently recommended by the SEC's Equity Market Structure Advisory Committee (**"EMSAC"**) Trading Venues Regulation Subcommittee to effect a more equitable NMS Plan process. In particular, we believe that the role of NMS Plan Advisory Committees (on which certain key groups of market participants are represented) should be enhanced and that the role of SRO-controlled Executive Sessions should be restricted. We would also go further than the EMSAC Subcommittee in recommending that Congress should revise the Exchange Act so that a representative from certain key constituent groups of Advisory Committees (e.g., broker-dealers and investors) should each be granted a formal vote on NMS Plan matters.

Specific Recommendation:

5. The NMS Plan process should be revised so that exchange SROs do not have outsize influence in the rulemaking process. Representatives of exchanges, broker-dealers and investors should be permitted to vote on any NMS Plans.

Another consequence of exchanges' SRO status is that, unlike other market participants, they are immune from certain types of legal liability. Exchange immunity originated from their adjudicatory and disciplinary responsibilities, but has expanded to encompass their regulatory functions more generally. Given that exchanges outsource many regulatory functions and are now for-profit entities that compete with other market participants, their limited legal immunity now seems an unfair and outdated competitive advantage.

Specific Recommendation:

6. Once SRO surveillance and enforcement responsibilities have been centralized to the extent practicable, Congress should revisit the Exchange Act to reconsider exchange immunity. Exchange immunity should only be

available for regulatory functions unique to exchanges that cannot be effectively centralized.

Part II: Undisplayed or "Dark" Trading

Undisplayed or "dark" trading describes trades that are executed without the use of publicly displayed orders. In contrast, a displayed quote is viewable by the public and includes: (1) the stock symbol, (2) whether the order is one to buy or to sell, (3) the number of shares, and (4) the price. It is important to note that trade *execution* data must be publicly reported regardless of whether the *quotation* data for that trade was displayed.

A. Dark Trading Across Trading Venues

Dark trading has always been a part of equity markets, but dark trading volume has increased in recent years. Although it is widely acknowledged that effectively all trading on ATSs and via broker-dealer internalization occurs in the dark, according to some estimates, a significant amount (roughly 11-14%) of trading volume on exchanges also occurs in the dark. However, it is difficult to estimate the actual amount of dark trading on exchanges with any certainty, because exchanges do not disclose their dark trading volumes. Indeed, the significant amount of dark trading on exchanges is often overlooked, and public concern regarding dark trading often focuses on ATS regulation. In our view, to produce regulations that accurately reflect and respond to the existing market landscape, transparency regarding dark trading on exchanges must be improved.

Specific Recommendation:

7. Required disclosures of registered exchanges should be revised to include trading volumes attributable to undisplayed ("dark") order flow.

B. Dark Trading and Market Quality

This section presents (1) empirical data and (2) a literature review regarding dark trading and certain market quality metrics. First, we briefly revisit CCMR's

empirical findings presented in Chapter 1 that relate to the impact of dark trading on market quality. The CCMR data shows that measurable price improvement to the NBBO may be obtained via dark executions. The frequency and magnitudes of such price improvement according to venue and order type (market and limit) are described as well.

Second, we present a review of the academic literature that evaluates the impact of dark trading on market quality. Studies have identified a number of potential positive effects of dark trading, including reduced volatility, increased market depth, improved liquidity, narrower spreads, and improved price discovery. However, other studies have concluded that dark trading may yield limited price improvement or may harm price discovery. Studies have also produced mixed conclusions regarding the effect of varying levels of dark trading on market quality.

We believe that the regulation of dark trading should be based in empirical findings regarding the relationship between dark trading and market quality. In general, we believe that enhanced disclosures regarding dark trading, as endorsed in Recommendations 3 and 7, can improve investor outcomes and confidence in our markets. We offer no further policy recommendations stemming from our empirical research and literature review at this time, because in our view the literature is inconclusive in informing appropriate next steps.

C. Trade-at Rule

The "trade-at" rule is a potential reform that would encourage the public display of orders. The rule would prohibit a trading venue from executing a trade at the NBBO if the trading venue had not been publicly displaying a quote at the NBBO when the order was received. In other words, to execute a trade in the dark, the trading venue could not simply match the best publicly displayed price. Instead, the trading venue could either execute the order with "significant" price improvement to the NBBO or else route the order to a trading venue that was publicly displaying the NBBO.

We have certain concerns with a trade-at rule. First, such a rule could reduce dark trading and any market quality improvements that are attributable thereto. For example, the benefits of executing in the dark are not solely from price improvement. Dark trading *at* the NBBO, which would be prohibited by the trade-at rule, can also reduce the price impact of a large institutional order. In addition, experiences abroad (in Canada and Australia) indicate that a trade-at rule may be associated with negative market quality effects.

We conclude that a broad trade-at prohibition is unlikely to be the most efficient approach to encourage the public display of orders. We believe that the factors that drive dark trading are varied, nuanced, and generally legitimate. In our view, some dark trading is likely an attempt to avoid certain costs associated with publicly displaying orders, including those caused by exchange access fees. We therefore recommend implementing reforms to reduce the cost of publicly displaying orders instead of a trade-at rule. Such reforms are introduced in Chapter 3.

Specific Recommendation:

8. The SEC should *not* implement a trade-at rule, as it could increase investor transaction costs without appreciably improving market quality.

CHAPTER 3: REGULATION NATIONAL MARKET SYSTEM

Part I: The Order Protection Rule

This section discusses the rules intended to ensure that investors receive the best prices for their orders. First, the duty of best execution requires that broker-dealers seek to obtain the best terms for customer orders. Prior to Reg NMS, orders for exchange-listed stocks were also subject to the Intermarket Trading System Plan (**"ITS Plan"**), which sought to ensure that trading venues executed orders at the best price. Reg NMS eliminated the outdated ITS Plan and replaced it with the order protection rule.

A. The Duty of Best Execution

The duty of best execution requires broker-dealers to seek to execute customer trades at the most favorable terms reasonably available under the circumstances. It derives from common law agency principles and fiduciary obligations. Broker-dealers must consider a number of factors to help them identify the best terms reasonably available, but the duty of best execution is not a guarantee that customer orders will receive the best terms in every instance.

B. The ITS Plan

The ITS Plan was the precursor to the order protection rule. It required orders for exchange-listed stocks to be executed at the trading venue displaying the best price. In practice however, the ITS Plan often caused orders to miss the best price, because it required broker-dealers to check quotes at both automated and slower, manual venues. An order that is executed at a worse price than the best publicly available price is known as a "trade-through." The SEC adopted Rule 611 of Reg NMS (the **"order protection rule"**) to reduce trade-throughs by protecting only automated quotes.

C. The Order Protection Rule

The order protection rule effectively eliminated the ITS Plan. Instead, it requires trading centers (including exchanges, ATSs and broker-dealer internalizers) to establish, maintain, and enforce written policies and procedures that are reasonably designed to prevent trade-throughs of "protected quotations." Protected quotations are the best publicly displayed bids and offers on each exchange and the ADF operated by FINRA. While the rule restricts order execution at a price worse than the NBBO, trading centers are free to execute at a price matching the NBBO, even if they were not displaying that price.

D. Achieving the Goals of the Order Protection Rule

Rule 605 and Rule 606 disclosures do not provide the information necessary for a retail investor to determine whether they are getting the best prices for their order. To address this concern, we recommend that each retail brokerage produce a

report combining order routing statistics and statistics regarding execution quality received at *each venue* to which it routes its customers' orders.

Specific Recommendation:

9. Retail brokerages should be required to provide disclosures regarding execution quality for their customers. Relevant disclosures should include percent of shares with price improvement, effective/quoted spread ratio, and average price improvement.

Another potential concern with current reporting rules is that there are no disclosure requirements specific to large institutional orders. Presently, voluntary institutional disclosure practices vary considerably among broker-dealers. We believe that broker-dealers should be required to provide standardized disclosures regarding order routing and execution quality statistics, so institutional investors can better determine whether they are getting the best prices.

Specific Recommendation:

10. The SEC should require broker-dealers to provide institutional customers with standardized reports that provide order routing and execution quality statistics.

Another problem is that Rule 605 requires trading venues to disclose executions to the tenth of a second, but prevailing order speeds are much faster (often in the microseconds (1 millionth of a second) for the most liquid stocks). In our view, trading venues should be required to disclose execution speeds to the millisecond, so customers are better able to detect and respond to inefficient routing and execution practices.

Specific Recommendation:

11. Trading venue disclosures should include information about execution speeds to the millisecond.

Additionally, Rules 605 and 606 permit the submission of statistical information in a variety of formats, hindering comparisons among venues and broker-dealers. We recommend that a standardized format for statistical information be adopted for Rule 605 and 606 disclosures and for new institutional order disclosures.

Specific Recommendation:

12. Statistical information for disclosures pursuant to Rule 605 and Rule 606 and disclosures regarding institutional orders should be submitted in only one format to facilitate comparison across trading venues and among broker-dealers.

The ability of the SEC and FINRA to determine whether investors are obtaining the best prices for their orders depends on their surveillance capabilities. In July 2012, the SEC adopted Rule 613, requiring the development of an NMS Plan to establish and implement the Consolidated Audit Trail (**"CAT"**). Once implemented, the CAT will be an order tracking system and information repository that allows regulators to track order and quote specifications across trading venues. However, the CAT is an extremely costly project: the SEC estimates $2 billion in implementation costs and $1.5 billion in annual reporting costs for broker-dealers, and the SEC's cost benefit analysis did not determine the extent to which these significant costs would be passed on to investors. While we support the CAT, we believe that the SEC's analysis must determine the extent to which such costs will be passed on to investors and ensure that there is a fair and balanced apportionment across both the industry and exchanges.

Specific Recommendation:

13. The SEC's cost benefit analysis for the Consolidated Audit Trail did not determine whether the $2 billion in implementation costs and $1.5 billion in annual reporting costs for broker-dealers would be passed on to investors. Prior to finalizing the CAT, the SEC should conduct a *publicly available* analysis that evaluates the costs and benefits of the CAT, and applies the cost

benefit analysis to ensure that the CAT is implemented efficiently, with costs allocated appropriately amongst the stakeholders.

Odd lots are trades for less than the standard trading unit of 100 shares and are exempt from the order protection rule. Exempting these transactions from the order protection rule creates concerns that investors are missing the best prices. In addition, orders exempt from the order protection rule are not reflected in the NBBO for a stock, reducing the accuracy of publicly displayed prices. We believe that redefining odd lots based upon the dollar value of a trade would be a prudent and efficient way to expand the benefits of the order protection rule. Higher-priced stocks are already more likely to trade in odd lots, and from the perspective of an investor, dollar value is a more meaningful measure of a trade's importance than the number of shares. This reform could improve both execution quality for investors and the accuracy of key market quality metrics.

Specific Recommendation:

14. The SEC should pass a rule applying the order protection rule to odd lot transactions above a threshold dollar amount, instead of a threshold share amount.

Part II: The Access Rules

Investors would not be able to obtain the best prices for their orders if broker-dealers could not *access* trading venues for their customers in a fair and efficient manner. Rule 610 of Reg NMS sets forth the rules by which market participants may access trading venues.

A. Access Fees

Trading venues have the authority to impose "access fees" on market participants executing trades. However, access fees are not expressly reflected in a stock's publicly displayed price, so high access fees can reduce stock price accuracy and increase transaction costs for investors. To address this risk, the SEC has implemented an access fee cap of 30 cents/100 shares for publicly displayed

orders. In practice, ATSs generally charge access fees of between 5-10 cents/100 shares and broker-dealer internalizers do not charge access fees. However, exchanges often charge the regulatory maximum as part of the "maker-taker" pricing system.

B. Maker-Taker Pricing System

Maker-taker is a pricing system whereby exchanges pay a per share rebate to market participants who provide ("make") liquidity in equities and assess a fee to the market participants that remove ("take") liquidity. The access fees charged by exchanges are typically close to the 30 cent maximum under Rule 610 and the rebates paid to liquidity providers are close to 20 cents. Access fees are generally used to fund liquidity rebates, and exchanges earn the difference.

The underlying purpose of the maker-taker pricing system is to attract liquidity providers and increase trading volumes. Exchange reliance on rebates to attract liquidity in turn drives the fees that they charge liquidity takers up to the regulatory maximum. It is our view that exchanges maintain high access fees because they are trapped in a prisoner's dilemma for protected quotes. If one exchange lowered its access fees, it would also have to reduce its liquidity rebates, and liquidity providers would likely migrate to other exchanges that offered higher rebates. In fact, a recent NASDAQ pilot program that reduced access fees had this very result.

In our view, the maker-taker pricing system has both positive and negative effects on market quality. The rebate establishes a financial incentive for the public display of liquidity, thereby increasing liquidity. On the other side of this coin, maker-taker pricing can also fuel market complexity, because new and complicated order types are frequently developed to navigate the landscape of fees and rebates. It can also interfere with the public display of orders by encouraging certain liquidity takers to trade off-exchange to avoid paying high exchange access fees.

C. Reducing the Access Fee Cap

One way to mitigate the market-distorting effects of maker-taker pricing is to reduce the access fee cap for highly liquid stocks. This change could reduce the

impact of fees and rebates on routing decisions and exchange revenue models without stymying the markets in the securities that rely on maker-taker for liquidity. We believe that a pilot program would be an effective way to determine the optimal parameters of a lower access fee cap and we support the recommended framework for an access fee cap pilot program that was submitted by the EMSAC Regulation NMS Subcommittee to the SEC on July 8, 2016. Although pilot programs can impose significant costs on market participants, we believe that these costs can be mitigated by the use of the infrastructure and data from pilots already planned or underway, such as the "Tick Size Pilot Program".

Specific Recommendation:

15. The SEC should implement a pilot program to evaluate the impact of a reduction in access fees and liquidity rebates on market quality and trading behavior. The structure of the pilot should generally conform to the framework proposed by the Equity Market Structure Advisory Committee Regulation NMS Subcommittee and leverage existing pilots as appropriate. [5]

D. Aligning Maker-Taker Pricing with the Disclosure Regime

We also support reforms that would enhance broker-dealer disclosures in the context of the maker-taker system. More specifically, we recommend that broker-dealers be required to disclose how access fees and liquidity rebates affect their routing practices and whether they pass through liquidity rebates or access fees to their customers.

Specific Recommendation:

16. Broker-dealers should be required to disclose how access fees and liquidity rebates affect order routing practices and transaction costs for their customers.

[5] Citadel dissents from this recommendation.

Part III: The Sub-Penny Rule

Tick sizes are the minimum price variation (**"MPV"**) for quotations for stocks. During the mid-1990s, the majority of exchanges set tick sizes at fractions (e.g., 1/8th) of a dollar. But in 2000, the SEC directed the exchanges to develop a plan to convert their quotations from fractions to decimals, primarily because fractional tick sizes were creating wide spreads and increasing transaction costs for investors. The SEC has set the current MPV at one cent for listed stocks that trade above $1 per share. Rule 612 of Reg NMS, the "sub-penny rule," prohibits any venue from displaying, ranking, or accepting orders in increments smaller than one penny.

The minimum tick size for a stock is important because negative consequences can result from minimum tick sizes that are either too wide or too narrow. A tick size that is too narrow (e.g. one-tenth of one penny) can (1) cause "flickering quotations," in which a stock quote rapidly switches back and forth between prices, or (2) enable "stepping ahead," whereby a trader uses an economically insignificant quote to "step ahead" of an existing order. Flickering quotations are problematic because they can complicate broker-dealer routing decisions and hinder their ability to get the best prices for investors. Stepping ahead is problematic because it reduces the likelihood that orders posted by fundamental investors and liquidity suppliers will be executed, which in turn can disincentivize the public display of orders and ultimately increase bid-ask spreads. A tick size that is too wide (e.g. 10 cents for liquid stocks) sets an artificial floor on permissible bids and offers, which can also increase transaction costs for investors. These costs can disincentivize the public display of liquidity as well, because executions at price variations within the minimum tick size are possible in the dark.

The appropriate minimum tick size for a stock depends on the stock's natural spread, which is based on its fundamental supply from sellers and demand from buyers. For example, if the natural spread of a stock is 5 cents, then the ideal minimum tick size for that stock would also be 5 cents. However, determining each stock's natural spread and using that information to set the ideal tick size for each stock is not practicable. The natural supply and demand for each stock is difficult

to identify with precision and changes over time. Because of this difficulty, the SEC takes a "one-size fits all" approach, which is not responsive to a stock's individual liquidity characteristics.

A. Reducing Minimum Tick Sizes

We review empirical data suggesting that the penny tick size is artificially wide for certain highly liquid stocks, which may be driving up investor transaction costs. We recommend that the SEC consider lowering the MPV for these stocks, first by implementing a pilot program to test the effects of such a reduction.

Specific Recommendation:

17. After concluding the access fee pilot, the SEC should conduct a pilot program for reducing the tick size for highly liquid stocks. The pilot should include a control group and should not include a trade-at rule.

Part IV: Market Data Rules

A. Consolidated Market Data

Under the Exchange Act, the SEC must ensure that investors have access to consolidated market data at a reasonable and fair cost and in an effective and timely manner. Consolidated market data generally refers to: (1) pre-trade transparency – timely information on the best-priced displayed quotations; and (2) post-trade transparency – timely reports of trades that are executed. Trading venues and broker-dealers must have access to consolidated market data in order to comply with the order protection rule and duty of best execution.

There are two ways that market participants can obtain consolidated market data. The first is via the securities information processors (**"SIPs"**). Reg NMS requires trading venues to submit real-time quotation and trade information to the SIPs, which aggregate and disseminate consolidated market data. Consolidated data for each individual NMS stock must be disseminated through a single SIP and only SROs are permitted to establish SIPs. Second, market participants also have

the option to purchase market data directly from trading venues and consolidate it themselves. Reg NMS permits trading venues to sell access to their own "proprietary" data feeds, which are used for this purpose. In practice however, trading venues and broker-dealers that consolidate proprietary data feeds must still purchase access to the SIPs. It is important to note that the transmission speed of proprietary data is faster than that of the SIP. As a result, data from proprietary feeds arrive at users faster than SIP data arrives at users. Recent efforts by the SEC to reduce the speed differential have been successful, but a meaningful difference in speed persists.

B. Criticisms of the Market Data Rules

Two concerns with the SIPs are that (1) there is a speed disparity between proprietary data feeds and the SIPs; and (2) the SIPs have certain resiliency weaknesses. Broker-dealers and trading venues that rely on the SIPs for consolidated market data are thus at a disadvantage—they depend on a system with resiliency deficiencies and may be missing the best prices for their orders.

C. How to Reform the Market Data Rules

Improving the transparency of the SIPs is a first step to reform this system. More specifically, enhanced disclosures regarding SIP and proprietary data feed revenues and performance data would allow investors to objectively compare the cost and quality of these market data sources and would force SROs to accept responsibility for deficiencies in the SIPs.

Specific Recommendations:

18. The SEC should require exchanges to publicly disclose revenues from the SIPs, the allocation of market data revenues among SIP Plan Participants and revenues from proprietary data feeds.

19. The SEC should require exchanges to disclose performance data for the SIPs and proprietary data feeds to facilitate a comparison of the relative speeds with which investors can obtain actionable market data from each.

Ultimately, we believe that introducing competition among SIPs would benefit investors in four major ways. First, we believe that subjecting SIPs to competition would narrow their performance gap with proprietary data feeds. This change would level the playing field between investors who rely on the SIP with those who also use proprietary data feeds. Second, competition could encourage improvements in resiliency by forcing SIP operators to invest in SIP technology and by ensuring that alternate sources of consolidated data would be available if one were to fail. Third, faster SIPs would better equip trading venues and broker-dealers that rely on the SIP to comply with the order protection rule and their duty of best execution. Finally, competition among multiple SIPs could reduce the cost of market data. Today, many broker-dealers purchase access to proprietary data feeds *and* the SIPs, even though they provide much of the same market data. Faster SIPs could obviate the need for broker-dealers to pay for proprietary data feeds in addition to the SIP.

To implement a competing consolidators structure, the SEC should first replace the Reg NMS provision that permits only SROs to establish and operate SIPs with a rule that defines SIP operator eligibility according to functional and technical standards. Second, the SEC should enact reforms to improve the minimum performance of the SIPs. Requiring SIPs to meet objective data quality metrics would ensure the achievement of a performance baseline, and introducing a competitive framework would then provide an incentive to exceed these standards.

Specific Recommendation:

20. After requiring disclosure of exchange market data revenues, the SEC should adopt a "Competing Consolidator" model for data dissemination. As a first step to implementing this framework, the SEC should promote reforms in the governance and transparency of the current SIPs.

CHAPTER 4: ENHANCING EQUITY MARKET RESILIENCY

Part I: Examining Recent Incidences of Volatility in U.S. Equity Markets

A. The 2010 Flash Crash

On May 6, 2010, the equity markets experienced a so-called "Flash Crash" when the prices in a large number of equity-based securities abruptly fell by $1 trillion in value and then quickly rebounded. According to a report by the SEC and CFTC, the Flash Crash was likely triggered when a mutual fund executed an algorithmic trade that entered a series of exceptionally large and aggressive sell orders. Automated market makers initially absorbed the selling pressure, but soon became unsure about the financial risk that they were taking by continuing to trade, so they widened spreads or stopped offering buy-side liquidity. Prices in the stock and futures market plunged until they triggered a trading halt on the Chicago Mercantile Exchange (a futures exchange), after which market participants slowly stepped in to purchase securities and prices largely rebounded.

B. Automated Market Makers and Manual Market Makers

Due to events like the Flash Crash, there is concern that the liquidity provided by market makers in today's market structure is illusory because during volatile market conditions market makers will withdraw from the market, thereby exacerbating rather than relieving market stress. To evaluate these concerns, we examine the rules that applied to market makers in manual markets (**"NYSE specialists"**) and compare them to the rules that apply to market makers in today's automated markets. We find that the primary differences are: (1) automated market makers are generally allowed to trade for their own account, whereas specialists were subject to the "negative obligation" that restricted such trading; and (2) automated market makers are not required to trade against the market trend, whereas specialists were required to trade against the market. The SEC approved these rule changes because of practical differences in market making in automated as opposed to manual markets, as we describe.

C. The Market Break of 1987

We then compare the performance of market makers during the Flash Crash with the performance of NYSE specialists during the crash of 1987 and find certain notable similarities in the actions of market makers. We therefore do not make any specific recommendations to change the rules applicable to market makers, as we do not believe the Flash Crash provides clear support for such changes.

D. The Market Events of August 24, 2015

More recently, on August 24, 2015, concerns about the health of the Chinese economy led to a dramatic (8.5%) overnight decline in the Shanghai Composite Index in China, setting the stage for a shaky open to the U.S. stock market. That morning, U.S. equity markets experienced delayed openings, severe price dislocations, extreme volatility, and an uneven and unusual level of trading halts. Turmoil in the stock market also caused disruptions in the exchange-traded fund (**"ETF"**) market, as ETF market makers generally provide quotes for the ETF based on the prices of the ETFs' underlying securities. We believe that the SEC should pursue reforms that would support the efficient pricing of ETFs in the face of trading halts of the underlying securities. The NYSE has suggested that the SEC consider aligning halt procedures between individual equities and ETFs. While we do not currently have a specific recommendation on this topic, we tentatively agree that the SEC should consider rules that would halt the trading of an ETF if a sufficiently high percentage of its underlying securities are subject to a trading halt.

Part II: Enhancing Volatility Controls

A. Market-wide Circuit Breakers

Market-wide circuit breakers are designed to briefly shut down trading across all stocks and all trading venues when a reference index experiences a certain percentage decline. Shutting down trading provides market participants with time to evaluate and react to new market information. However, the efficacy of these circuit breakers depends largely on their calibration: they must be triggered during turmoil, but must not be so sensitive that they disrupt trading due to ordinary course price fluctuations. During the flash crash and events of August

24, 2015, the market-wide circuit breakers in place were not triggered, despite the extreme volatility on those days. A review of the circuit breaker activation thresholds is in order. We recommend that the thresholds are further refined to respond to volatility in a fixed number of stocks or percentage of an index. In addition, breach of "Limit Up-Limit Down" (**"LULD"**) thresholds (which track volatility in individual stocks, as further discussed below) should be treated as the signal of critical levels of volatility for each stock.

Specific Recommendation:

21. Thresholds for market-wide circuit breakers should be adjusted so that they are triggered when a pre-determined number of stocks or percentage of an index display extreme volatility by triggering their individual trading halts.

Both the Flash Crash and August 24 highlighted the interconnection between equity markets and futures markets—in each instance, disruptions in one market spread to the other. This connection between equity markets and the futures market also impacts the effectiveness of volatility controls like market-wide circuit breakers. Without inter-market coordination, shutting down trading in certain securities could spur extreme disruptions in markets in related securities. For market-wide circuit breakers to have their intended effect of stabilizing trading by giving market participants time to respond to information, it is important that thresholds are harmonized between the equity markets and futures market.

Specific Recommendation:

22. The SEC and the Commodity Futures Trading Commission should work together to harmonize the thresholds for market-wide circuit breakers in the stock market with the futures market.

B. Trading Halts for Individual Stocks

The SEC implemented the LULD mechanism to target anomalous price movements in individual or few securities. The LULD mechanism assigns a fixed price band to each individual security, prevents trade execution outside of that

price band, and then pauses trading in that security if price volatility is not quickly corrected. LULD thus protects market participants from trading at extreme and unintended prices and provides time for them to adjust their orders during periods of volatility. On August 24th, LULD trading pauses were triggered on a widespread but non-universal basis. One factor that drove the large number of LULD pauses was the fact that the width of LULD price bands doubles during the open and close of trading. Wider bands during the open accommodate greater volatility in stocks, and the band narrows after 15 minutes. This inconsistency can disrupt the markets—for example, volatility during the open can trigger immediate LULD halts when the narrower bands kick in. We therefore recommend that consistent LULD price bands are applied throughout the trading day.

Specific Recommendation:

23. The SEC should establish uniform LULD intraday price bands, instead of wider bands during the market open and close.

C. "Breaking" Clearly Erroneous Trades

The SROs have the authority to cancel a trade if the price at which it occurred indicates that the trade was entered into due to an obvious error. This power to nullify trades protects investors from being bound by unintentional trades at terms they clearly would not have intended to accept, thereby promoting fair and orderly markets. Rules regarding these "clearly erroneous" trades generally require SROs to cancel trades according to certain percentage deviations from a reference price. However, uncertainty regarding the application of clearly erroneous rules contributed to the market turmoil experienced during the Flash Crash and August 24th. To improve the clarity of the rules, we recommend that LULD thresholds are aligned with "clearly erroneous" thresholds.

Specific Recommendation:

24. The SEC should eliminate clearly erroneous trade guidelines by aligning them with the thresholds for LULD rules.

D. Kill Switches

Kill switches halt trading for a specific market participant on a trading venue when that entity's trading activity has breached a pre-established exposure threshold on that trading venue. They are thus intended to stop a specific market participant's erroneous orders or uncontrolled accumulation of unintended positions. Certain exchanges currently offer kill switches, but they are of limited utility because they are optional and non-uniform. To mitigate volatility caused by the unintentional actions of individual market participants, we recommend that standardized kill switches be mandatory across exchanges for all broker-dealer members. Each kill switch should have an automatic trigger at both the exchange and broker-dealer member level when the threshold is breached.

Specific Recommendation:

25. The SEC should require mandatory kill switches on all exchanges for all exchange members.

E. Regulatory Trading Halts

Exchanges have the authority to call regulatory trading halts for their listed securities under the NMS Plans that cover NYSE-listed securities and NASDAQ-listed securities. Once a listing exchange decides a regulatory halt is appropriate and institutes one, the listing exchange must notify the other SROs. Regulatory trading halts are generally effective across all trading venues. Regulatory trading halts may be called due to (i) inadequate or pending disclosure of material information to the public; or (ii) "regulatory problems relating to" a security "that should be clarified before trading therein is permitted to continue," including extraordinary market activity due to system misuse or malfunction. However, in the event of operational difficulties (e.g., a SIP outage), there are no standardized rules for when a regulatory trading halt should be implemented. This discretion leads to unpredictability, which can discourage the provision of liquidity during operational failures. To avoid such uncertainty, we believe that it is important to have clear standards in place for regulatory trading halts.

Specific Recommendation:

26. The SEC should clarify exchange regulatory halt procedures in the event of specific operational failures (e.g., SIP failure).

POLICY RECOMMENDATIONS

CHAPTER 2: TRADING VENUES AND UNDISPLAYED LIQUIDITY

1. ATSs should be allowed to limit access to their trading venues. [6]

2. ATSs should not be required to obtain pre-approval from the SEC before adopting trading rules.

3. The SEC should require that disclosures on new Form ATS-N are published in a standardized format.

4. The surveillance and enforcement regulatory responsibilities currently assigned to SROs should be centralized to the extent practicable. The reorganization could include centralization at either the SEC or FINRA.

5. The NMS Plan process should be revised so that exchange SROs do not have outsize influence in the rulemaking process. Representatives of exchanges, broker-dealers and investors should be permitted to vote on any NMS Plans.

6. Once SRO surveillance and enforcement responsibilities have been centralized to the extent practicable, Congress should revisit the Exchange Act to reconsider exchange immunity. Exchange immunity should only be available for regulatory functions unique to exchanges that cannot be effectively centralized.

7. Required disclosures of registered exchanges should be revised to include trading volumes attributable to undisplayed ("dark") order flow.

8. The SEC should *not* implement a trade-at rule, as it could increase investor transaction costs without appreciably improving market quality.

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[6] Citadel dissents from this recommendation.

9. Retail brokerages should be required to provide disclosures regarding execution quality for their customers. Relevant disclosures should include percent of shares with price improvement, effective/quoted spread ratio, and average price improvement.

10. The SEC should require broker-dealers to provide institutional customers with standardized reports that provide order routing and execution quality statistics.

11. Trading venue disclosures should include information about execution speeds to the millisecond.

12. Statistical information for disclosures pursuant to Rule 605 and Rule 606 and disclosures regarding institutional orders should be submitted in only one format to facilitate comparison across trading venues and among broker-dealers.

13. The SEC's cost benefit analysis for the Consolidated Audit Trail did not determine whether the $2 billion in implementation costs and $1.5 billion in annual reporting costs for broker-dealers would be passed on to investors. Prior to finalizing the CAT, the SEC should conduct a *publicly available* analysis that evaluates the costs and benefits of the CAT, and applies the cost benefit analysis to ensure that the CAT is implemented efficiently, with costs allocated appropriately amongst the stakeholders.

14. The SEC should pass a rule applying the order protection rule to odd lot transactions above a threshold dollar amount, instead of a threshold share amount.

15. The SEC should implement a pilot program to evaluate the impact of a reduction in access fees and liquidity rebates on market quality and trading behavior. The structure of the pilot should generally conform to the framework

proposed by the Equity Market Structure Advisory Committee Regulation NMS Subcommittee and leverage existing pilots as appropriate. [7]

16. Broker-dealers should be required to disclose how access fees and liquidity rebates affect order routing practices and transaction costs for their customers.

17. After concluding the access fee pilot, the SEC should conduct a pilot program for reducing the tick size for highly liquid stocks. The pilot should include a control group and should not include a trade-at rule.

18. The SEC should require exchanges to publicly disclose revenues from the SIPs, the allocation of market data revenues among SIP Plan Participants and revenues from proprietary data feeds.

19. The SEC should require exchanges to disclose performance data for the SIPs and proprietary data feeds to facilitate a comparison of the relative speeds with which investors can obtain actionable market data from each.

20. After requiring disclosure of exchange market data revenues, the SEC should adopt a "Competing Consolidator" model for data dissemination. As a first step to implementing this framework, the SEC should promote reforms in the governance and transparency of the current SIPs.

CHAPTER 4: ENHANCING EQUITY MARKET RESILIENCY

21. Thresholds for market-wide circuit breakers should be adjusted so that they are triggered when a pre-determined number of stocks or percentage of an index display extreme volatility by triggering their individual trading halts.

22. The SEC and the Commodity Futures Trading Commission should work together to harmonize the thresholds for market-wide circuit breakers in the stock market with the futures market.

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[7] Citadel dissents from this recommendation.

23. The SEC should establish uniform LULD intraday price bands, instead of wider bands during the market open and close.

24. The SEC should eliminate clearly erroneous trade guidelines by aligning them with the thresholds for LULD rules.

25. The SEC should require mandatory kill switches on all exchanges for all exchange members.

26. The SEC should clarify exchange regulatory halt procedures in the event of specific operational failures (e.g., SIP failure).

THE U.S. EQUITY MARKETS

A Plan for Regulatory Reform

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INTRODUCTION

Statutory Objectives for U.S. Equity Markets

The evolution of the U.S. equity market structure into today's highly connected and automated landscape was largely initiated by the adoption of the Securities Acts Amendments of 1975 (the "**1975 Amendments**").[8] The 1975 amendments began a significant transformation away from the historical market landscape, which was characterized by trade execution at manual venues that were generally isolated from each other.[9] This legislation did so by amending the Securities Exchange Act of 1934 (the **"Exchange Act"**) to "...foster the development of a national securities market system."[10] Congressional findings that "new data processing and communications techniques create the opportunity for more efficient and effective market operations" laid the foundation for this effort.[11]

Congress delegated the implementation of the national market system to the Securities and Exchange Commission (**"SEC"**), as the agency mandated "to protect investors, maintain, fair, orderly, and efficient markets, and promote capital formation."[12] This approach was "designed to provide maximum flexibility to the SEC and the securities industry in giving specific content to the general concept of a national market system."[13]

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[8] Pub. L. No. 94-29, 89 Stat. 97 (1975).
[9] *Testimony Concerning Preserving and Strengthening the National Market System for Securities in the United States: Before the S. Comm. on Banking, Housing, and Urban Affairs*, 106th Cong. 2 (2000) (statement of Arthur Levitt, Chair, U.S. SEC. & EXCH. COMM'N), *available at* https://www.sec.gov/news/testimony/ts082000.htm.
[10] Pub. L. No. 94-29, 89 Stat. 97 (1975).
[11] Pub. L. No. 94-29, 89 Stat. 97, 111 (1975).
[12] 15 U.S.C. § 78k(a)(2) (1994); *What We Do*, U.S. SEC. & EXCH. COMM'N, *available at* https://www.sec.gov/about/whatwedo.shtml (last modified Jun. 10, 2013).
[13] H.R. Rep. No. 94-229, at 92 (1975) (Conf. Rep.).

In the 1975 Amendments, Congress presented five essential goals that should underpin the SEC rules governing the national market system. These five objectives are codified in Section 11A of the Exchange Act.

First, the SEC should seek to assure the economically efficient execution of securities transactions.[14] As discussed throughout the report, measures taken to minimize transaction costs for retail and institutional investors are a key component of this effort.

Second, the SEC should seek to assure fair competition among brokers and dealers, among exchanges, and between exchanges and markets other than exchanges.[15] Such competition encourages innovation in trading services that can reduce transaction costs. Having multiple trading venues can also improve market stability, because if one venue has an isolated problem, order flow can be shifted to other venues.

Third, the SEC should assure that information regarding quotations for and transactions in stocks is available to investors and broker-dealers.[16] Broker-dealers need this price transparency to send investor orders to the trading venues that offer the best available prices for investors.

Fourth, the SEC is required to assure the practicability of brokers executing investors' orders in the best market.[17] In other words, the SEC's rules should help broker-dealers fulfill their duty of "best execution." The duty of best execution requires brokers to seek the most favorable terms reasonably available for the execution of their customers' trades.[18] Many factors may contribute to what is considered a favorable execution, such as price, speed, and likelihood of execution.[19]

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[14] Pub. L. No. 94-29, 89 Stat. 112 (1975).
[15] *Id.*
[16] *Id.*
[17] *Id.*
[18] *See, e.g.*, *Best Execution*, U.S. SEC. & EXCH. COMM'N, *available at* http://www.sec.gov/answers/bestex.htm (last modified May 9, 2011).
[19] *See id.*

Fifth, the SEC's rules should assure the opportunity for investors' orders to be executed without the participation of a dealer.[20] In the context of today's markets, this requirement essentially means that the national market system should promote optimal "order interaction." In other words, even though there are multiple trading venues, investor orders should be exposed to as many other orders as possible to facilitate their ability to receive best execution.

In furtherance of these five objectives, Congress found that "the linking of all markets for qualified securities through communication and data processing facilities will foster efficiency, enhance competition, increase the information available to brokers, dealers, and investors,... and contribute to best execution of such orders."[21] Since 1975, the SEC has therefore sought to adapt the rules governing the U.S. equity markets to technological advances in order to promote competition, efficiency, and investor outcomes.

To support the modernized national market system, the 1975 Amendments also revised the Exchange Act to establish a national system for the clearance and settlement of securities transactions.[22] To this end, Congress directed the SEC "to facilitate the establishment of linked or coordinated facilities for clearance and settlement of transactions in securities."[23] The shift towards "linked" rather than "vertically-integrated" clearing and settlement facilities helped to decentralize order flow and spread trading volume to multiple competing venues.[24]

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[20] Pub. L. No. 94-29, 89 Stat. 97, 112 (1975).
[21] *Id.*
[22] *See* 15 U.S.C. § 78q-1 (2010).
[23] 15 U.S.C. § 78q-1(a)(2)(A)(ii) (2010).
[24] *See* Memorandum from SEC Division of Trading and Markets to SEC Market Structure Advisory Committee, Rule 611 of Regulation NMS, U.S. SEC. & EXCH. COMM'N 2 (Apr. 30, 2015), *available at* https://www.sec.gov/spotlight/emsac/memo-rule-611-regulation-nms.pdf.

History and Evolution of U.S. Equity Markets

Manual Markets

From the 1970s until the mid-2000s, U.S. equity markets were predominately manual markets with exchange-based floor trading. The manual market landscape had some marked differences from the modern structure.

One difference between the manual market structure and today's automated market structure is the degree of competition among trading venues. Trading in the manual markets was highly centralized and certain rules amplified this effect. For example, until 2000, the New York Stock Exchange (**"NYSE"**) Rule 390 prohibited NYSE members from using off-exchange venues to execute trades.[25] During this time, trading volumes were often consolidated at a stock's listing exchange. In contrast, today's automated market structure features numerous and diverse trading venues where trades may be routed for execution. (Some refer to the decentralization and diffusion of trading volume among trading venues as "market fragmentation.") This report describes these automated trading venues and evaluates the policy implications of this structure.

On the other hand, there are also similarities between the manual market structure and today's automated markets. For example, broker-dealer internalization, whereby a broker-dealer executes trades within that firm and without using an outside trading platform, existed in manual markets.[26] Broker-dealer internalizers typically act as principals in each trade, instead of matching buyers and sellers, and so executing trades in this manner largely circumvents the

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[25] *Id.*

[26] *See, e.g.*, *supra* note 9. *See also* NYSE Rulemaking: Notice of Filing of Proposed Rule Change to Rescind Exchange Rule 390; Commission Request for Comment on Issues Relating to Market Fragmentation, Exchange Act Release No. 42450, File No. SR-NYSE-99-48 (Feb. 23, 2000), *available at* https://www.sec.gov/rules/sro/ny9948n.htm ("Internalization is the routing of order flow by a broker to a market maker that is an affiliate of the broker. An integrated broker-dealer, for example, internalizes orders by routing them to the firm's market-making desk for execution."); Richard Y. Roberts, Commissioner, U.S. SEC. & EXCH. COMM'N, Remarks at the Ray Garrett Jr. Corporate and Securities Law Institute, Payment for Order Flow 10 (Apr. 29, 1993), *available at* https://www.sec.gov/news/speech/1993/042993roberts.pdf.

formal regulatory structures in place at trading venues. In addition, payment for order flow arrangements also existed in the manual markets. This practice generally involves broker-dealer internalizers paying other brokers for the right to execute their customer orders internally.[27] Broker-dealer internalization remains an important practice in today's equity marketplace, as further discussed in this report.

Another similarity between the manual and automated market structure is the existence of undisplayed or "dark" trading. Dark trading generally refers to executions that avoid the public display of orders. There have always been reasons for market participants to want to avoid publicly displaying their orders. For example, institutional investors often seek to avoid the public display of their large orders, because doing so would move the price against the investor and make it costlier for them to trade.[28]

Measures intended to avoid publicly displaying a large order have consistently occurred both on- and off-exchange. In manual markets, broker-dealers would execute large orders on exchanges by breaking them into smaller orders and gradually executing them, to minimize their effect on the market price.[29] In today's automated market structure, execution algorithms perform the same task by breaking up large orders for institutional investors and executing them on- and off-exchange. In the manual markets, broker-dealers also executed large orders in what was referred to as the "upstairs market." The upstairs market involved broker-dealers directly contacting other broker-dealers off of the trading floor and over the

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[27] *See* NYSE Rulemaking: Notice of Filing of Proposed Rule Change to Rescind Exchange Rule 390; Commission Request for Comment on Issues Relating to Market Fragmentation, Exchange Act Release No. 42450, File No. SR-NYSE-99-48 (Feb. 23, 2000), *available at* https://www.sec.gov/rules/sro/ny9948n.htm; Roberts, *supra* note 26, at 2.

[28] *See* Concept Release on Equity Market Structure, Exchange Act Release No. 61358, File No. S7-12-98 18 (Jan. 14, 2010), *available at* https://www.sec.gov/rules/concept/2010/34-61358.pdf.

[29] *See* Joel Hasbrouck, et al., *New York Stock Exchange Systems and Trading Procedures* 5, 39 (NYSE Working Paper No. 93-01, 1993), *available at* http://people.stern.nyu.edu/jhasbrou/Research/Working%20Papers/NYSE.PDF; ROBERT A. SCHWARTZ & RETO FRANCIONI, EQUITY MARKETS IN ACTION: THE FUNDAMENTALS OF LIQUIDITY, MARKET STRUCTURE & TRADING 73 (2004); Stavros Gadinis, *Market Structure for Institutional Investors; Comparing the U.S. and E.U. Regimes*, 3 VA. L. & BUS. REV. 311, 325 (2008), *available at* http://scholarship.law.berkeley.edu/facpubs/948.

phone, which allowed them to avoid publicly displaying their institutional customers' large orders.[30]

Automation of Equity Markets

Once automated electronic communication systems developed in the late 1990s, broker-dealers began to implement electronic and automated trading systems that challenged the dominance of the manual model.[31] These trading systems allowed buyers and sellers of stock to communicate directly with one another over an automated platform.

In 1998, the SEC passed Regulation Alternative Trading Systems (**"Reg ATS"**), subjecting these automated trading venues (alternative trading systems or **"ATSs"**) to certain core elements of exchange regulation.[32] In today's equity markets, the hallmark of ATSs is that they generally do not publicly display quotations. As a result, ATSs are often colloquially referred to as "dark pools."[33] However this term is imprecise, as dark trading also occurs on exchanges, as described in Chapter 2 of this report.

ATSs operated on a for-profit basis, which is noteworthy because exchanges had traditionally operated as not-for-profit mutual organizations,[34] with their broker-dealer members handling exchange governance. Broker-dealer members

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[30] *See* Gadinis, *supra* note 29, at 325-26. *See generally* Hasbrouck, *supra* note 29, at 39; Donald Keim & Ananth Madhavan, *The Upstairs Market for Large-Block Transactions: Analysis and Measurement of Price Effects*, 9 THE REVIEW OF FINANCIAL STUDIES 1 (1996), *available at* http://www.business.unr.edu/faculty/liuc/files/RUC/topic_upstairsmarket/Keim_Madhavan_1996.pdf.

[31] Michael A. Perino, *Securities Law for the Next Millennium: A Forward-Looking Statement*, in FACULTY PUBLICATIONS, ST JOHN'S L. SCHOLARSHIP REPOSITORY Paper 77,7-8 (2001), *available at* http://scholarship.law.stjohns.edu/faculty_publications/77.

[32] Annette L. Nazareth, *Remarks*, 75 ST. JOHN'S L. REV. 15, 18 (2012), *available at* http://scholarship.law.stjohns.edu/cgi/viewcontent.cgi?article=1378&context=lawreview.

[33] As discussed in detail throughout this report, dark trading occurs on other venues as well, including via non-displayed orders on exchanges.

[34] Roberta S. Karmel, *Turning Seats Into Shares: Implications of Demutualization for the Regulation of Stock Exchanges*, 53 HASTINGS L.J. 367, 369 (2001-2002), *available at* http://ssrn.com/abstract=256867.

were motivated to manage the exchange because they used the venue to execute trades.[35] However, the proliferation of automated trading venues put competitive pressure on this structure, in part because many of the broker-dealer members of exchanges had begun to operate competing trading venues. In order to remain competitive, the major stock exchanges converted to for-profit entities between 2000 and 2005 and shortly thereafter converted to public companies with dispersed ownership.[36]

Despite the advent of electronic marketplaces in the early 2000s, the regulations that were in place until 2006 provided slower manual markets with a competitive advantage.[37] Specifically, the Intermarket Trading System (**"ITS"**) Plan effectively imposed a thirty-second execution delay for automated marketable orders in exchange-listed stocks.[38] The ITS Plan gave manual exchanges little incentive to update and automate their trading processes, so their dominant market shares in exchange-listed stocks persisted.[39]

Where regulations did not artificially hinder the impact of automation, its effects on the markets were immediate and extensive. Trading in NASDAQ stocks is illustrative, because the ITS Plan applied only to exchanges, and NASDAQ had not yet registered as an exchange when the ITS Plan was in place.[40] Automation spurred a rapid increase in competition and fragmentation among venues trading in NASDAQ stocks.[41] Other innovations that characterize modern automated trading also gained traction at an earlier point in the NASDAQ markets. These include the

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[35] *See id.*
[36] Reena Aggarwal, *Demutualization and Corporate Governance of Stock Exchanges*, J. APPLIED CORPORATE FINANCE 105, 108-109 (2002), *available at* https://www.set.or.th/setresearch/files/demutualization/ResearchPaper_2002_Reena.pdf.
[37] Regulation NMS, Exchange Act Release No. 51808, 70 Fed. Reg. 37496, 37501 (Jun. 29, 2005), *available at* https://www.sec.gov/rules/final/34-51808fr.pdf.
[38] *Id.*
[39] *See* Concept Release on Equity Market Structure, Exchange Act Release No. 61358, File No. S7-12-98 4-5 (Jan. 14, 2010), *available at* https://www.sec.gov/rules/concept/2010/34-61358.pdf.
[40] Memorandum from SEC Division of Trading and Markets to SEC Market Structure Advisory Committee, Rule 611 of Regulation NMS, U.S. SEC. & EXCH. COMM'N 7 (Apr. 30, 2015), *available at* https://www.sec.gov/spotlight/emsac/memo-rule-611-regulation-nms.pdf.
[41] *See id.*

use of (1) proprietary data feeds to transmit market data and (2) high frequency trading (**"HFT"**) strategies.[42] These innovations will be described later in this report.

In 2006, the implementation of Regulation National Market System ("Reg NMS") reshaped the equity market regulatory structure to spur the automation of equity markets and lower investor transaction costs.[43] Reg NMS has four pillars: (1) the "order protection rule," which, among other things, removed the competitive advantage that the ITS Plan had previously provided manual markets; (2) rules regarding the accessibility of trading venues; (3) rules setting a minimum pricing increment for orders for stock; and (4) rules for the public display of quotes for stocks and trade executions. The details of each of the four pillars of Reg NMS will be set forth in Chapter 3.

Following the implementation of Reg NMS, competition among trading venues in NYSE-listed stocks intensified. For example, the NYSE executed approximately 79% of the share volume in NYSE-listed stocks in 2005; four years later, NYSE's market share in those stocks had dropped to roughly 25%.[44] Chapter 2 will describe the current competitive landscape among trading venues in greater detail.

Concerns with Today's Equity Market Structure

According to Mary Jo White, the Chair of the SEC, "empirical evidence shows that investors are doing better in today's algorithmic marketplace than they

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[42] *Id.*

[43] Regulation NMS, Exchange Act Release No. 51808, 70 Fed. Reg. 37496, 37501 (Jun. 29, 2005), *available at* https://www.sec.gov/rules/final/34-51808fr.pdf.

[44] Concept Release on Equity Market Structure, Exchange Act Release No. 61358, File No. S7-12-98 8 6 (Jan. 14, 2010), *available at* https://www.sec.gov/rules/concept/2010/34-61358.pdf (citing *NYSE Euronext Announces Trading Volumes for October 2009*, NYSE EURONEXT (Nov. 6, 2009), *available at* https://www.nyse.com/press/125741917814.html and Self-Regulatory Organizations; NYSE Arca, Inc.; Order Setting Aside Action by Delegated Authority and Approving Proposed Rule Change Relating to NYSE Arca Data, Exchange Act Release No. 59039, File No. SRNYSEArca-2006-21 (Dec. 2, 2008), *available at* https://www.sec.gov/rules/sro/nysearca/2008/34-59039.pdf).

did in the old manual markets."[45] Thus, the SEC should "not roll back the technology clock or prohibit algorithmic trading."[46]

However, a number of concerns with the U.S. equity market structure have emerged in recent years. The fragmented nature of the markets drives certain of these concerns. For example, a recent analysis of one firm's trading showed that a 1,000 share order was sent to 18 separate trading venues before it was completely executed.[47] Routing orders across multiple venues naturally involves different types of platforms with different trading rules. Thus, in certain ways, investors lack transparency regarding where and how their trades are executed, as compared to the highly centralized manual markets. The emergence of HFT strategies that are not well understood and yet account for 50% of all trades, according to some estimates,[48] also contributes to concerns that firms executing these short-term trading strategies may be profiting at the expense of long-term investors. Some have also suggested that the fragmented and high speed U.S. equity market structure may lack resiliency. Resiliency concerns are fueled by several recent incidents in which technical glitches and human errors caused widespread market disruption.

As detailed throughout this report, the SEC has made considerable progress in enhancing the regulatory landscape. However, there is more work to be done. Concerns related to transparency and equity market resiliency can negatively affect investor confidence and participation in U.S. equity markets, which in turn could make it costlier for U.S. companies to raise capital and for U.S. savers to invest.

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[45] Mary Jo White, Chair, U.S. SEC. & EXCH. COMM'N, Speech at the Sandler O'Neill & Partners, L.P. Global Exchange and Brokerage Conference, Enhancing Our Equity Market Structure (Jun. 5, 2014), *available at* https://www.sec.gov/News/Speech/Detail/Speech/1370542004312.
[46] *Id.*
[47] Jacob Bunge, *A Suspect Emerges in Stock-Trade Hiccups: Regulation NMS*, WALL ST. J. (Jan. 27, 2014), *available at* http://www.wsj.com/articles/SB10001424052702303281504579219962494432336.
[48] *See, e.g.*, World Federation of Exchanges, *Understanding High Frequency Trading* 2 (May 2013) ("HFT was estimated in 2012 by consultancy Tabb Group to make up 51% of equity trades in the US…"), *available at* http://modernmarketsinitiative.org/wp-content/uploads/2013/10/WFE_Understanding-HFT_May-2013.pdf.

Through this Report, the Committee seeks to contribute to the equity market reform effort in two distinct ways. First, we seek to educate the public and policymakers about the U.S. equity market structure and its performance for U.S. investors and public companies. Second, we offer twenty-six recommendations to enhance the existing regulatory framework.

CHAPTER 1: MARKET CHARACTERISTICS AND HIGH FREQUENCY TRADING

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CHAPTER 1: MARKET CHARACTERISTICS AND HIGH FREQUENCY TRADING

Chapter 1 sets forth the findings of our empirical analysis of stock quotation and execution data over the past 20 years. Part I considers key metrics of market performance to reach empirically-based conclusions regarding the impact of the automated market structure on investor outcomes.[49] *Part II then provides specific insight into HFT strategies. It includes a simple example of an HFT strategy and a review of the academic literature on HFT strategies and equity market quality.*

Part I: Equity Market Characteristics

A. Competition

Reg NMS and advancements in technology have helped the U.S. equity market evolve from an exchange-dominated, largely floor-based trading system into a diffuse ecosystem of automated trading venues that engage in vigorous competition for order flow. Trade execution is now divided among twelve exchanges and approximately forty ATSs.[50] The competitive landscape also

[49] Many results presented in this section are consistent with those initially set forth in Angel (2013), but are extended by using a longer period of time. James J. Angel et al., *Equity Trading in the 21st Century: An Update*, Q GROUP (Jun. 21, 2013), *available at* http://www.q-group.org/wp-content/uploads/2014/01/Equity-Trading-in-the-21st-Century-An-Update-FINAL1.pdf.

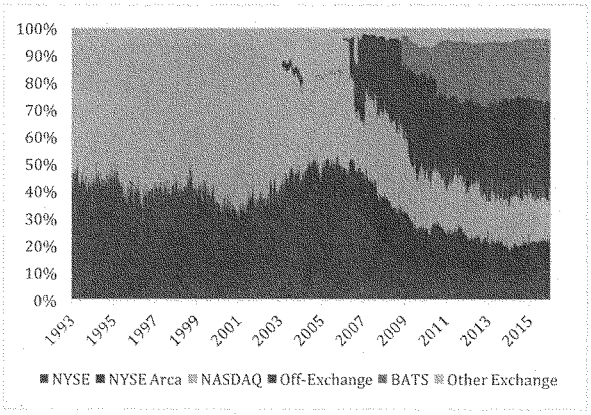
[50] Laura Tuttle, U.S. SEC. & EXCH. COMM'N, *Alternative Trading Systems: Description of ATS Trading in National Market System Stocks* (Oct. 2013), *available at* https://www.sec.gov/marketstructure/research/ats_data_paper_october_2013.pdf; Laura Tuttle, U.S. SEC. & EXCH. COMM'N, *OTC Trading: Description of Non-ATS OTC Trading in National Market System Stocks* (Mar. 2014), *available at* https://www.sec.gov/marketstructure/research/otc_trading_march_2014.pdf. *See also* Mary Jo White, Chair, U.S. SEC. & EXCH. COMM'N, Speech at the Sandler O'Neill & Partners, L.P. Global Exchange and Brokerage Conference, Enhancing Our Equity Market Structure (Jun. 5, 2014), *available at* https://www.sec.gov/News/Speech/Detail/Speech/1370542004312; Luis A. Aguilar, Commissioner, U.S. SEC. & EXCH. COMM'N, Public Statement, U.S. Equity Market Structure: Making Our Markets Work Better for Investors (May 11, 2015), *available at* https://www.sec.gov/news/statement/us-equity-market-structure.html.

includes approximately 250 broker-dealer internalizers that execute trades within their firm or with an affiliate rather than via an outside trading venue.[51]

1) Reg NMS and Trading Venue Market Share

Figure 1.1 documents the remarkable effect that Reg NMS had on the market share of various trading venues. After 2005, a number of exchanges emerged to challenge the dominance of NYSE and NASDAQ. Off-exchange executions also increased, representing another dimension of competition. Off-exchange execution includes broker-dealer internalization and executions on ATSs; approximately 37.4% of trading now occurs off-exchange.[52]

Figure 1.1: Share of Trading Volume by Venue[53]

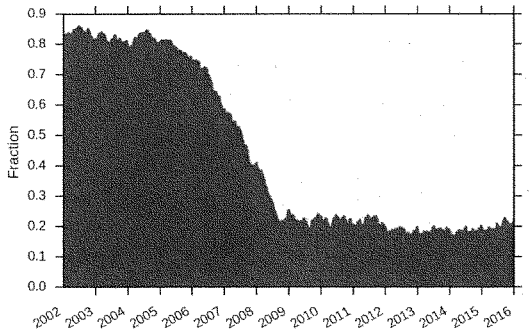


[51] White, *supra* note 50.
[52] TABB Group, Equities LiquidityMatrix April 2016, 3, *available at* http://mm.tabbforum.com/liquidity_matrices/186/documents/original_2016-04_Equities_Liquidity_Matrix_April_2016.pdf.
[53] Source: Trade and Quote ("TAQ") database. Daily aggregate trading volume by venue code.

2) Reg NMS and NYSE Market Share

Figure 1.2 shows the effect of competition on NYSE's market share of trading volume in NYSE-listed stocks. As shown in Figure 1.2, NYSE's share of such trading volume has declined from the pre-NMS level of close to 80% to a post-NMS level near 20%.

Figure 1.2: NYSE Share of Trading Volume in NYSE-Listed Stocks[54]



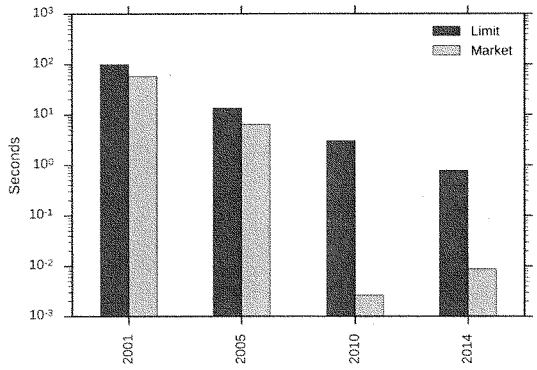
B. Automation

1) Automation and NYSE Execution Speed

As illustrated in Figure 1.3, the time required for NYSE to execute a market order was nearly 100 seconds in 2001. By autumn 2014, NYSE had become roughly 10,000 times faster, executing market orders in less than .01 seconds. Figure 1.3 shows how NYSE execution speed has evolved over time. The vertical axis is shown on a log scale so that recent speeds are visible.

[54] Source: Center for Research in Security Prices ("CRSP") and TAQ databases. Data reflects a 5-day moving average for smoothness.

Figure 1.3: NYSE Execution Speed (Log Scale)[55]

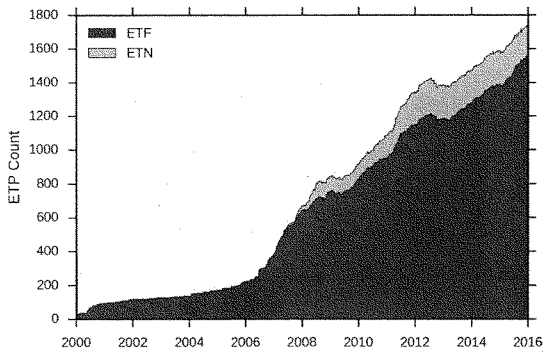


2) Automation and New Securities Products

Automation has coincided with the emergence of innovative new products like exchange traded funds (**"ETFs"**) and exchange traded notes (**"ETNs"**). The rapid proliferation of ETFs and ETNs is illustrated in Figure 1.4.

[55] Source: NYSE Rule 605 disclosures.

Figure 1.4: Exchange Traded Funds and Exchange Traded Notes[56]



3) Automation and Aggregate Daily Trading Volume

As shown in Figure 1.5, trading volume in securities that are subject to NMS transaction reporting plans (**"NMS securities"**) grew rapidly as the markets became increasingly automated during the 1990s and 2000s. This trading volume then peaked at the end of 2008. Angel (2013) attributes this peak to post-2008 attrition of firms that employ HFT strategies, due to the high degree of competition among such firms.[57] Since its 2008 peak, trading volume in NMS securities has stabilized around 7 billion shares per day.

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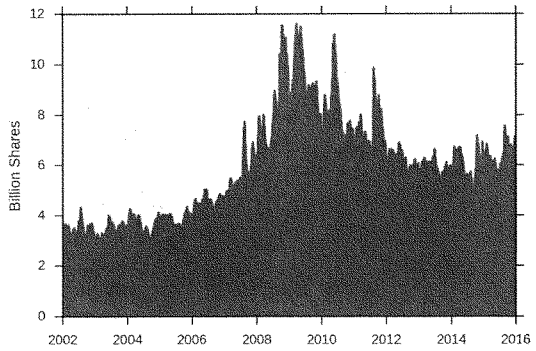
[56] Source: CRSP Mutual Fund Database.

[57] Angel et al., *supra* note 49; *see also* Matthew Baron et al., *Risk and Return in High Frequency Trading*, U.S. COMMODITY FUTURES TRADING COMM'N (Apr. 2014), *available at* http://www.cftc.gov/idc/groups/public/@economicanalysis/documents/file/oce_riskandreturn0414.pdf.

Figure 1.5: Total Daily Trading Volume in NMS Securities[58]

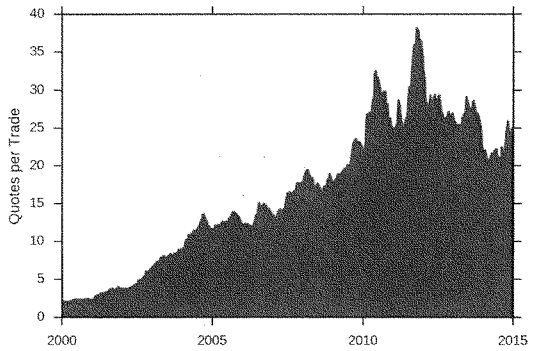


4) Automation and Quotes per Trade

Automation has enabled market participants to update their positions with greater frequency. Automated trading strategies continuously update quotes to avoid adverse selection and to incorporate information much faster than they could in the manual era. As a result, the number of quotes per trade increased during the transition to automation. This trend can be seen in Figure 1.6, which highlights the large increase in quotes per trade over the past decade. Figure 1.6 also shows that quotes per trade have declined from their peak. Similar to the trading volume trend illustrated in Figure 1.5, this decline may be attributable to competition putting downward pressure on the number of economically viable HFT strategies.[59]

[58] Source: TAQ database. Data reflects a 10-day moving average for smoothness.
[59] *See* Angel et al., *supra* note 49; Baron, *supra* note 57.

Figure 1.6: Median Intraday Quotes per Trade[60]



C. Volatility

Volatility generally refers to the extent to which a stock's price fluctuates over a period of time. High volatility is considered unfavorable, because it indicates a high level of uncertainty about a stock's value. A common concern with automation is the belief that it has contributed to an increase in stock market volatility. We explore this issue below.

1) Long-term Volatility Measures

The Chicago Board Options Exchange Volatility Index (**"VIX"**) is a commonly used indicator of long-term volatility, expressing the expected volatility of the S&P 500 index over the next month. The VIX, often called "the investor fear index,"[61] increases during periods of market stress. Figure 1.7 shows the level of the VIX over time. As evident in this figure, VIX levels are at historically average levels.

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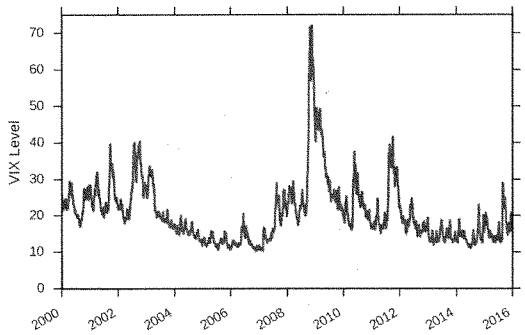
[60] Source: TAQ database. Data reflects a 2-day moving average for smoothness.

[61] Sam Bourgi, *What Volatility is Saying about US Stocks*, EconomicCalendar.com (Mar. 19, 2016), *available at* http://www.economiccalendar.com/2016/03/19/what-volatility-is-saying-about-us-stocks/.

Figure 1.7: Market Volatility (level of VIX)[62]



2) Intraday Volatility

Intraday volatility is a measure of how much stock prices change during a trading day, as opposed to other volatility measures that focus only on closing prices. This is the measure most likely to be "felt" by investors, as it measures how much the value of their investment fluctuates throughout the trading day.

Figure 1.8 shows intraday volatility of stocks at the 90th, 50th, and 10th percentiles for such volatility. These groups are intended to represent the most volatile stocks (90th percentile), stocks of median volatility (50th percentile), and the least volatile stocks (10th percentile).

The blue line shows stocks at the 90th percentile of volatility, which means that 90% of stocks have a lower intraday volatility than these stocks, and 10% have higher volatility. The 90th percentile thus gives an indication of the intraday volatility for the most volatile stocks. The intraday volatility of these stocks has

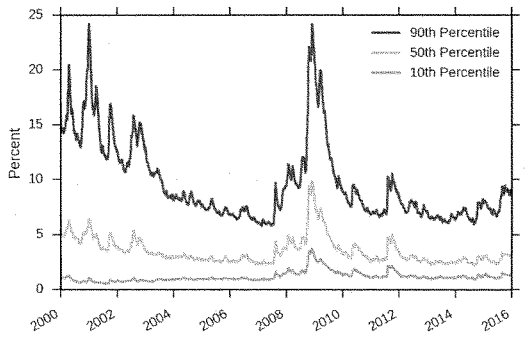
[62] Source: Yahoo! Finance data for Chicago Board Options Exchange Volatility Index ("VIX"). Data reflects a 2-day moving average for smoothness.

dropped from roughly 20% in 2001, and a more recent peak of almost 25% during the financial crisis, to less than 10% as of 2016.

The yellow line shows stocks with median volatility, giving an indication of intraday volatility for a typical stock. As shown in the figure, these stocks experienced intraday volatility of approximately 3% as of 2016, down from roughly 5% in 2000.

Finally, the grey line shows the least volatile stocks, for which volatility has remained at a consistently low level of roughly 2% or less since 2000, except for a spike in volatility during the financial crisis.

Figure 1.8: Intraday Volatility[63]



D. Liquidity and Transaction Costs

Market liquidity is a multi-faceted concept that measures the ease with which a security can be bought and sold. Liquidity can be evaluated along three dimensions: (1) *market depth* – the amount of publicly displayed offers to buy or

[63] Source: CRSP database. Intraday volatility is defined as (high minus low) / low. Data reflects a 10-day moving average for smoothness.

sell at the best available price; (2) *immediacy* – how quickly trades of a given size can be arranged at a given cost;[64] and (3) *market breadth* – the transaction cost of executing a trade of a given size.

For a retail investor, the transaction cost of buying or selling stock largely depends on the bid-ask spread and the commissions charged by the broker-dealer to execute a trade. For an institutional investor, transaction costs also depend on the broker-dealer's ability to execute large orders without prices moving against the order (**"price impact"**).

1) Market Depth and Immediacy

Market depth and immediacy are closely related concepts and are often directly correlated. Empirical trends in market depth are thus likely accompanied by similar trends in immediacy. We examine market depth below.

The total share volume of the displayed quotes to buy or sell at the national best bid and offer (**"NBBO"**) is referred to as the "NBBO volume depth". In theory, NBBO volume depth reflects the amount of stock that an investor can trade immediately at the best prevailing price. As shown in Figure 1.9, NBBO volume depth has generally increased or remained stable since 2003.

The blue line in Figure 1.9 shows the change over time in stocks with an NBBO volume depth in the 75th percentile. These are stocks with a high degree of depth, as 75% of stocks have less depth at the NBBO. Our findings demonstrate that NBBO volume depth for these stocks has increased since 2005.

The yellow line shows the change over time in stocks with the median NBBO volume depth and the grey line shows the change over time in stocks with NBBO volume depth at the 25th percentile. The levels of depth for these stocks has remained relatively constant since 2002.

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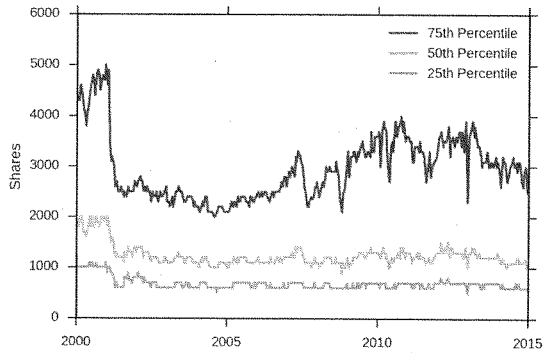
[64] *See* LARRY HARRIS, TRADING AND EXCHANGES 73 (2003).

Figure 1.9: Volume Depth Available at NBBO[65]



2) Market Breadth

a) Spreads at the NBBO

Figure 1.10 shows the evolution of bid-ask spreads over time. Spreads declined dramatically following decimalization in the early 2000s (when minimum quoting increments were lowered from 1/8ths and 1/16ths of one dollar to one cent).[66]

The blue line in Figure 1.10 represents stocks with bid-ask spreads in the 75th percentile. Stocks with spreads in the 75th percentile have wider spreads than most stocks, as only 25% of stocks have a wider spread and 75% of stocks have a narrower spread. We find that these stocks now have spreads of approximately 10 cents as compared to 25 cents in 2000.

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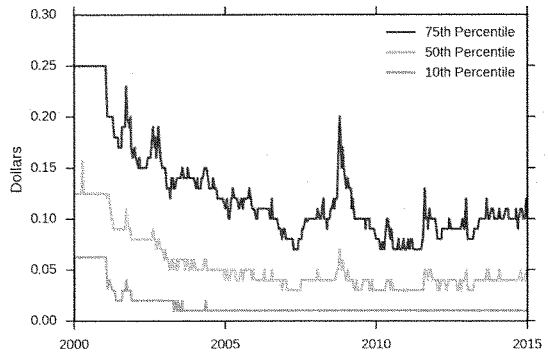
[65] Source: TAQ database.

[66] *See Testimony Concerning The Effects of Decimalization on the Securities Markets: Before the S. Comm. on Banking, Housing, and Urban Affairs*, 107th Cong. (2001) (statement of Laura S. Unger, Acting Chair, U.S. SEC. & EXCH. COMM'N), *available at* https://www.sec.gov/news/testimony/052401tslu.htm.

The yellow line in Figure 1.10 represents stocks with the median bid-ask spreads. We find that these stocks now trade at spreads of less than 5 cents as compared to spreads of over 10 cents in 2000. Finally, the grey line shows stocks with spreads in the 10th percentile. This means that 90% of stocks have wider spreads than these stocks. As demonstrated in Figure 1.10, these 10th percentile stocks have traded at penny spreads since 2004.

Figure 1.10 Quantiles of NBBO Spread over Time[67]



b) Other Measures of Market Breadth

Empirical studies have found that other key components of market breadth have declined in recent years. Angel et al. (2013) document a decline in both retail brokerage commissions and institutional brokerage commissions. For example, Angel et al. show that the average commission charged by the three major retail brokers is approximately $10 per trade;[68] in contrast, full-service broker commissions ranged from $75 to $150 per trade-through the mid-1990s.[69] Other

[67] Source: TAQ database.
[68] Angel et al., *supra* note 49.
[69] Yannis Bakos et al., *The Impact of E-Commerce on Competition in the Retail Brokerage Industry*, INFORMATION SYSTEMS RESEARCH 4 (2005), *available at* http://pages.stern.nyu.edu/~bakos/ebrokers.pdf.

estimates find that as recently as 2001, brokers charged institutional investors about 5 cents/share to execute a large order, while brokers now charge only 1.5 cents/share.[70]

Angel et al. also find that institutional investors are able to execute their large orders with record low price impact. For example, they find that a hypothetical $30 million institutional order today would only cost roughly $120,000 in price impact, whereas in 2000 it would have cost three times as much.[71] Greenwich Associates estimates that U.S. annual institutional equity trading costs have decreased more than 30% from their peak in 2009, to $9.65 billion in 2016.[72] Another study similarly estimates that the institutional trading costs for U.S. large cap stocks have declined by more than 19% since 2010.[73]

A reduction in transaction costs can have a significant impact on long-term returns for investors. For example, a 2010 letter by Vanguard cited estimates that transaction costs for investors had been reduced by at least 35% since 2000, with some estimating a reduction of more than 60%.[74] They quantified the impact of reduced transaction costs on long-term investors, finding that $10,000 invested in a mutual fund over 30 years would (as of 2010) yield a long-term investor $132,000

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[70] Andre Cappon, *The Brokerage World is Changing, Who Will Survive?*, FORBES (Apr. 16, 2014), *available at* http://www.forbes.com/sites/advisor/2014/04/16/the-brokerage-world-is-changing-who-will-survive/.

[71] Angel et al., *supra* note 49.

[72] *See Broker Commissions on Institutional U.S. Equity Trades Flat at $9.65 Billion*, GREENWICH ASSOCIATES (Jul. 13, 2016), *available at* https://www.greenwich.com/press-release/broker-commissions-institutional-us-equity-trades-flat-965-billion.

[73] Aguilar, *supra* note 50; *Global Cost Review 2014/Q3*, INVESTMENT TECHNOLOGY GROUP 8 (Jan. 14, 2015), *available at* http://www.itg.com/marketing/ITG_GlobalCostReview_Q3_2014_20150205.pdf; *Global Cost Review 2010/Q2*, INVESTMENT TECHNOLOGY GROUP 6 (Oct. 27, 2010), *available at* http://www.itg.com/wp-content/uploads/2009/12/ITGGlobalCostReview_2010Q2_Final.pdf.

[74] The Vanguard Group, SEC Comment Letter, Re: Concept Release on Equity Market Structure File Number S7-02-10 2 (Apr. 21, 2010), *available at* https://www.sec.gov/comments/s7-02-10/s70210-122.pdf.

instead of $100,000.[75] More recent data demonstrates that total transaction costs have continued to decline and are down an additional 16% since 2009.[76]

E. Undisplayed or "Dark" Liquidity

Undisplayed or "dark" liquidity generally refers to trades that are executed without the public display of an order. In contrast, visible or "lit" liquidity generally refers to trades that are executed by posting certain information about an order (e.g. size and price) that can be viewed by all other market participants. Chapter 2 of this report further describes and contextualizes dark liquidity in today's equity markets.

Trading in the "dark" can be beneficial to investors when it results in trades being executed at better prices than the NBBO (referred to as "price improvement"). However, critics of dark trading often claim that dark transactions offer trivial price improvements, if any, to investors.[77] It is also important to note that even if a trade is executed without price improvement, trading in the "dark" can be beneficial to institutional investors if it helps minimize the price impact of a large order. We discuss this issue further in Chapter 2.

To assess whether trading in the "dark" provides investors with price improvement, we review Rule 605 disclosures by trading venues.[78]

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[75] *Id.* at 2-3.

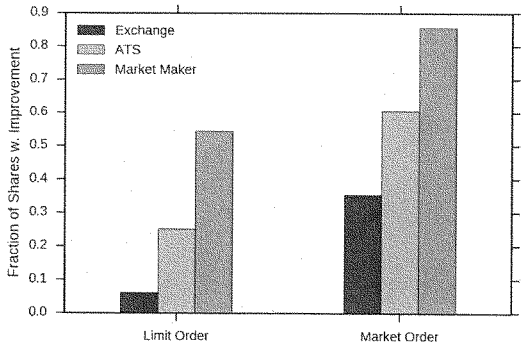
[76] *Global Cost Review Q1/2016,* INVESTMENT TECHNOLOGY GROUP 4 (Apr. 27, 2016) (ITG estimates that transaction costs decreased from 54.6 basis points in the third quarter of 2009 to 45.8 basis points in the first quarter of 2016), *available at* http://analyticsincubator.itginc.com/tasks/render/file/?fileID=E438E97A-7B0B-445D-8DF6A122F60E086D.

[77] *See* Sviatoslav Rosov, *HFT, Price Improvement, Adverse Selection: An Expensive Way to Get Tighter Spreads?*, CFA INST. (Dec. 18, 2014), *available at* https://blogs.cfainstitute.org/marketintegrity/2014/12/18/hft-price-improvement-adverse-selection-an-expensive-way-to-get-tighter-spreads/.

[78] 17 C.F.R. § 242.605 (2005); Rule 605 requires trading venues to prepare monthly reports that publicly disclose basic, standardized information about the execution quality that they achieve for retail-size customer orders.

Figure 1.11 shows that exchanges, ATSs, and broker-dealer internalizers (referred to below as market makers) each offer price improvement for limit orders (orders to execute at a pre-determined price) and market orders (orders to execute at the NBBO) that are executed in the dark. For example, Figure 1.11 shows that more than 80% of market orders that are internalized and approximately 60% of market orders that are executed at an ATS receive price improvement.

Figure 1.11: Frequency of Price Improvement by Venue Type[79]



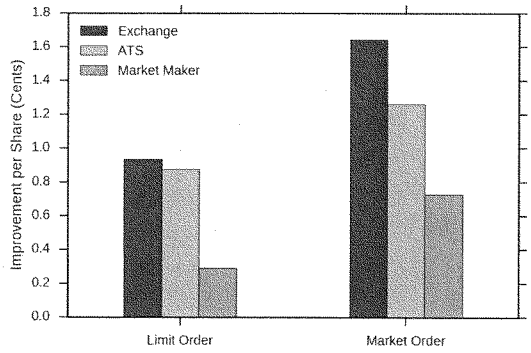
Moreover, our review of Rule 605 disclosures also indicates that dark trading offers *measurable* price improvement. As demonstrated in Figure 1.12, we find that the average per share price improvement provided to limit and market orders on exchanges and ATSs is over 0.8 cents when executed in the dark.[80] Our

[79] Source: Rule 605 filings for March, April, and May 2016. Market maker data gathered for top 9 venues for non-ATS OTC transactions in Reg NMS stocks (Citadel Securities LLC, KCG Americas LLC, G1 Execution Services LLC, Goldman Sachs & Co, UBS Securities LLC, Two Sigma Securities LLC, Deutsche Bank Securities, Morgan Stanley & Co LLC, and Citigroup Global Markets Inc.). ATS data gathered for 5 of the top 10 ATSs for transactions in Reg NMS stocks (UBS ATS, IEX, JPM-X, Level ATS, and Barclays LX ATS).

[80] *See* Figure 1.12. Our analysis focused on undisplayed market orders and marketable limit orders at exchanges, broker-dealer internalizers, and ATSs.

data also shows that dark market orders that are internalized receive an average price improvement of over 0.7 cents per share.[81]

Figure 1.12: Magnitude of Price Improvement by Venue Type[82]



Part II: High Frequency Trading Strategies and Equity Market Quality

High frequency trading strategies make up a significant segment of trading activity in the modern equity markets. According to some estimates, nearly 50% of U.S. equity market trading volume is attributable to HFT strategies.[83] However,

[81] *Id.*

[82] Source: Rule 605 filings for March, April, and May 2016. Market maker data gathered for top 9 venues for non-ATS OTC transactions in Reg NMS stocks (Citadel Securities LLC, KCG Americas LLC, G1 Execution Services LLC, Goldman Sachs & Co, UBS Securities LLC, Two Sigma Securities LLC, Deutsche Bank Securities, Morgan Stanley & Co LLC, and Citigroup Global Markets Inc.). ATS data gathered for 5 of the top 10 ATSs for transactions in Reg NMS stocks (UBS ATS, IEX, JPM-X, Level ATS, and Barclays LX ATS).

[83] *See, e.g.*, Gregory Meyer et al., *Casualties Mount in High-Speed Trading Arms Race*, THE FINANCIAL TIMES (Jan. 22, 2015), *available at* http://www.ft.com/intl/cms/s/0/38a1437e-a1eb-11e4-bd03-00144feab7de.html (citing data from TABB Group).

despite their crucial role in today's equity markets, there is still limited public understanding of how HFT strategies work in practice. [84]

The first section of this part describes HFT strategies generally, with a brief explanation of the types of activities commonly labeled HFT strategies. It also summarizes two broad types of HFT strategies: (1) market making and (2) arbitrage strategies. The section follows with an example of a high frequency arbitrage strategy, which is simulated using historical market data. This simulation illustrates the role that speed plays in the equity markets and provides tentative evidence of the effect of competition on HFT strategies.

The second section of this part provides a review of the academic literature regarding the relationship between HFT strategies and market quality. The literature review generally supports the conclusion that HFT strategies are positively associated with market quality. This section also evaluates certain popular criticisms of HFT strategies in the context of empirical research.

A. Description of High Frequency Trading Strategies

In today's markets, high speed execution and data services are accessible to a wide range of market participants, and many different types of institutions and traders use these services.[85] Indeed, retail and institutional investors often have access to some of the highest speed execution services through their broker-dealers. We therefore believe that an informed analysis of the role of HFT in U.S. equity markets should focus on identifying the functional characteristics of HFT strategies, rather than classifying institutions that engage in such strategies as "HFT firms."

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[84] The Committee on Capital Markets Regulation has contributed to the improvement of public understanding through its December 2014 fact statement on high frequency trading, *available at* http://capmktsreg.org/app/uploads/2014/12/2014-12-29_CCMR_-What_Is_High_-Frequency_Trading.pdf.

[85] Concept Release on Equity Market Structure, Exchange Act Release No. 61358, File No. S7-12-98 45 (Jan. 14, 2010), *available at* https://www.sec.gov/rules/concept/2010/34-61358.pdf.

Common functional characteristics of HFT strategies include: (1) use of high speed and sophisticated programs for generating, routing, and executing orders; (2) use of execution services and proprietary data feeds offered by exchanges to minimize network and other latencies; (3) very short timeframes for establishing and liquidating positions; (4) submission of numerous orders that are cancelled shortly after submission; and (5) ending the trading day in as close to a flat position as possible (that is, not carrying significant, unhedged positions overnight).[86] HFT strategies are also often characterized by extremely low average profits per trade[87] and as having little or no correlation with traditional long-term buy and hold strategies.[88]

One way to understand HFT strategies is as a variant of traditional market making and/or arbitrage strategies that have always existed in equities markets. We explain these strategies below and how automation has allowed market participants to execute them more efficiently.

1) Automated Market Making

The U.S. equity markets have always relied on certain market participants acting as market makers. These market makers perform the essential function of meeting the liquidity demands of fundamental investors who cannot efficiently trade with each other.[89] For example, an investor wishing to buy 100 shares of XYZ may not immediately find another investor wishing to sell 100 shares of XYZ, because these investors may disagree on price and/or come to the market at different times. To facilitate executions, a market maker intermediates the trade. Market makers do so by displaying quotes for a given set of stocks. They display a "bid" price to buy a stock from investors and an "ask" or "offer" price to sell a stock to investors. The liquidity provided by market makers therefore helps investors enter or exit positions. In order to determine their quotes, market makers

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[86] *Id.*
[87] IRENE ALDRIDGE, HIGH-FREQUENCY TRADING: A PRACTICAL GUIDE TO ALGORITHMIC STRATEGIES AND TRADING SYSTEMS 1 (Apr. 22, 2013).
[88] *Id.*
[89] Concept Release on Equity Market Structure, Exchange Act Release No. 61358, File No. S7-12-98 49-50 (Jan. 14, 2010), *available at* https://www.sec.gov/rules/concept/2010/34-61358.pdf.

use available market data to reach the best determination of the immediate supply and demand for a stock.

The most straightforward way for a market maker to earn a profit is to capture the spread, or the difference between the bid and the ask price of a stock. For example, a market maker would seek to buy at a bid of $10.00 and sell at a higher ask price of $10.01, earning the penny spread. Of course, market makers risk losing on trades if they buy at a bid of $10.00 and have to sell at a lower ask price of say $9.99. This can occur when they misjudge the short-term supply and demand for a stock.

Given the constant fluctuation of supply and demand for stocks and the fact that market maker quotes are not executed immediately, market makers must constantly update their bid and ask quotes based on new market data. Updating their quotes often requires them to cancel unfilled orders and post new quotes based on changes in the market price for a stock.[90] Market makers' ability to perform their trading strategies has been enhanced by (1) access to high speed execution and data services from exchanges; and (2) the proprietary technology necessary to quickly assess the supply and demand for that security and rapidly update their quotes.

2) Arbitrage Strategies

Arbitrage strategies are a fundamental component of trading in securities markets. Arbitrage opportunities arise when the same asset trades on multiple markets at different prices, or when two related assets trade at divergent prices. Such price divergences can occur for various reasons. For example, market participants may be trading more actively in one market versus another market. When prices between the same or related assets diverge, arbitrageurs can profit by simultaneously buying the lower priced asset and selling the higher priced asset, until prices converge.

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[90] *See* Matt Levine, *Why Do High-Frequency Traders Cancel So Many Orders?*, BLOOMBERG (Oct. 8, 2015), *available at* https://www.bloomberg.com/view/articles/2015-10-08/why-do-high-frequency-traders-cancel-so-many-orders-.

Statistical arbitrageurs identify related securities that have historically traded within a certain price range. When the prices of these securities diverge from their historical and fundamental trading patterns, statistical arbitrageurs assess whether the divergence is temporary or whether it is permanent.[91] For example, a *temporary* price change could be due to market-wide volatility, rather than a change in the expected future cash flows of the security itself. Statistical arbitrageurs then trade against temporary price changes seeking to realign the security with its previous price range.[92]

Arbitrage strategies can improve the accuracy of publicly displayed prices, because statistical arbitrageurs expend resources to seek out additional information and analyze its meaning for the price of the security. They then incorporate this information and analysis into the effective price of a security by buying or selling that security. As a result, the price of the security reflects more information.[93] This result is beneficial for the real economy, because more informative stock prices promote better resource allocation.[94]

HFT arbitrageurs are able to identify and trade against mispricings faster than ever before, which reduces the length of time that such mispricings exist. Investors can benefit from this result because they are able to enter and exit positions at prices that better reflect the fundamental value of a security.

3) Example of a High Frequency Trading Strategy

We simulate an HFT statistical arbitrage strategy on tick-level trade data for S&P Composite 1500 index constituents from (1) 6/2/2009 and (2)

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[91] *See* Jonathan Brogaard et al., *High Frequency Trading and Price Discovery* 5 (European Central Bank Working Paper No. 1602, 2013), *available at* https://www.ecb.europa.eu/pub/pdf/scpwps/ecbwp1602.pdf.
[92] *See id.*
[93] *See* Andre Shleifer & Robert Vishny, *The Limits of Arbitrage*, 52 THE JOURNAL OF FINANCE 1 (Mar. 1997).
[94] *See* Brogaard et al., *supra* note 91, at 31.

6/2/2014. The strategy is very simple and was used in Khadani and Lo (2007).[95] The procedure for our simulation was the following: over the course of the trading day, at every 1-minute interval (i.e. a 1-minute rebalancing frequency) we buy the 150 stocks that had the lowest return over the previous minute and we sell short the 150 stocks that had the highest return over the previous minute. From a functional perspective, the strategy used in our simulation is very similar to "mean reversion statistical arbitrage" strategies that preserve cross-correlation relationships between stocks over short time scales.[96]

Excluding transaction costs, this strategy earns a steady return and almost never loses money. However, we note that this simulation does not mean that a trader could employ this strategy and turn a profit. This is because there would be many expenses associated with executing this strategy. For example, market participants employing HFT arbitrage strategies must pay transaction fees and make substantial investments in technology and top-tier staff. Additionally, an HFT arbitrageur does not successfully complete every trade it hopes to execute. They must compete with other market participants, including other traders with access to similar technologies. These realities put a natural cap on the profitability of HFT arbitrage strategies.

Figure 1.13 illustrates the results of our simulations using 2009 data (in blue) and 2014 data (in gold). As the figure shows, the strategy's profitability declined markedly between 2009 and 2014. This trend provides tentative evidence that competition between HFTs has constrained the profitability of their strategies.

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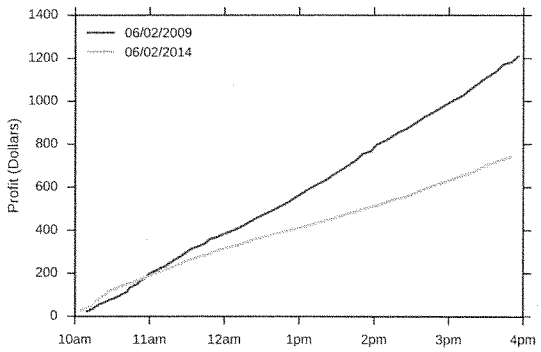
[95] Amir E. Khandani & Andrew W. Lo, *What Happened to the Quants in August 2007* (MIT Working Paper, 2007), *available at* http://web.mit.edu/Alo/www/Papers/august07.pdf.
[96] Andrew W. Lo & Craig MacKinlay, *When Are Contrarian Profits Due to Stock Market Overreaction?* (NBER Working Paper No. 2977, 1989), *available at* http://www.nber.org/papers/w2977.

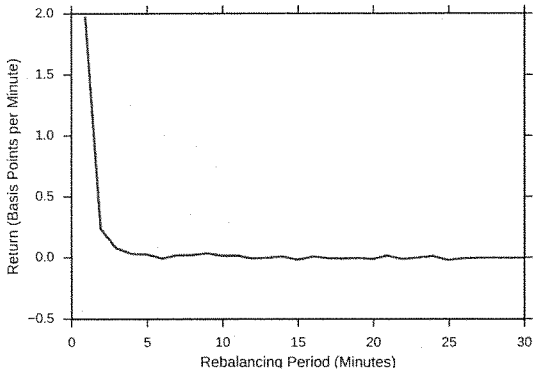
Figure 1.13: Gross Profits from an HFT Statistical Arbitrage Strategy with $10,000 Invested (Excluding Implicit and Explicit Transaction Costs)[97]



Using a proprietary data set that identifies individual traders, Brogaard (2010) concludes that many HFT algorithms follow price reversal strategies that are similar to our example, although they are likely more sophisticated.[98] As Figure 1.14 shows, the quicker an algorithm rebalances the portfolio of stocks, the higher the returns of the strategy. A correlation between speed and profitability is therefore not evidence that abusive or manipulative trading tactics are at play. Instead, the ability to react to market data at higher frequencies likely improves the efficiency of price discovery.

[97] Basis for statistical arbitrage strategy outlined in Amir E. Khandani & Andrew W. Lo, *What Happened to the Quants in August 2007?: Evidence from Factors and Transactions Data* (NBER Working Paper No. 14465, 2008), *available at* http://www.nber.org/papers/w14465.pdf.
[98] Jonathan A. Brogaard, *High Frequency Trading and Its Impact on Market Quality* 14 (2010), *available at* http://www.futuresindustry.org/ptg/downloads/HFT_Trading.pdf (finding that HFT algorithms "tend to buy stocks at short-term troughs and tend to sell stocks at short-term peaks").

Figure 1.14: Profitability of HFT Statistical Arbitrage Strategy as a Function of Trade Frequency (Smaller Rebalancing Period Implies Higher Frequency)[99]



B. HFT Strategies and Equity Market Quality

Despite the widespread use of HFT strategies in modern equity markets, public understanding of these strategies and their impact on markets remains limited. Certain depictions of HFT strategies in popular culture, such as those presented in Michael Lewis's book "Flash Boys," have fueled public skepticism about HFT strategies.[100] In this section, we address that public skepticism through an objective summary of the academic literature on HFT strategies as related to equity market quality.

A large body of empirical academic research regarding the relationship between HFT strategies and market quality has emerged over the past five years. This section describes the major findings and conclusions presented in the

[99] Basis for statistical arbitrage strategy outlined in Amir E. Khandani & Andrew W. Lo, *What Happened to the Quants in August 2007?: Evidence from Factors and Transactions Data* (NBER Working Paper No. 14465, 2008), *available at* http://www.nber.org/papers/w14465.pdf.
[100] *See* Eric Levenson & Dashiell Bennett, *Is High-Frequency Trading as Bad as Michael Lewis Wants You to Think?*, THE ATLANTIC (Apr. 1, 2014), *available at* http://www.thewire.com/business/2014/04/is-high-frequency-trading-as-bad-as-michael-lewis-wants-you-to-think/359903/; Michael Lewis, *Flash Boys: A Wall Street Revolt* (Norton 2014).

empirical academic literature. We find that this literature generally highlights a positive association between HFT strategies and market quality, particularly with respect to volatility, price efficiency, liquidity, and transaction costs.

Throughout the summary, we also briefly introduce certain popular criticisms of HFT strategies and relate these criticisms to illustrative empirical data. These criticisms are that HFT strategies: (i) increase the volatility of stock prices; (ii) create the illusion of liquidity, which vanishes during periods of market distress; (iii) are engaged in a so-called "arms race" that does not improve market quality; and (iv) earn outsize profits that represent economic "rents" from long-term investors.[101] We find that the disconnect between these criticisms and the empirical data suggests that there is a broader distrust of HFT strategies underlying the beliefs.

1) HFT Impact on Overall Market Quality

In a review of empirical academic research on HFT strategies, Jones (2013) finds that the studies evaluating a causal link between HFT activity and market quality generally conclude that HFT strategies improve market quality.[102] Gomber et al. (2011) conclude that "the majority [of academic literature] argues that HFT [strategies] generally contribute] to market quality and price formation and finds positive effects on liquidity and short-term volatility."[103] And a 2015 SEC paper found that HFT strategies can reduce transaction costs and improve pricing

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[101] *See, e.g.*, *High Frequency Trading's Impact on The Economy: Hearing Before the S. Subcomm. on Securities, Insurance and Investment*, 113th Cong. 2 (2014) (comments by Sen. Elizabeth Warren, Chairman, on the testimony of Hal S. Scott, Nomura Professor and Director of the Program on International Financial Systems, Harvard Law School); Gary Shorter & Rena S. Miller, Cong. Research Serv., R43608, High-Frequency Trading: Background, Concerns and Regulatory Developments (2014), *available at* http://fas.org/sgp/crs/misc/R43608.pdf.

[102] Charles M. Jones, *What do we know about high-frequency trading?* (Columbia Business School Research Paper No. 13-11, 2013), *available at* https://securitytraders.org/wp-content/uploads/2013/04/HFT0324.pdf.

[103] Peter Gomber et al., *High-Frequency Trading* (Goethe-Universitat Working Paper, 2011), *available at* http://www.asktheeu.org/en/request/425/response/2986/attach/3/HFT%20Study%20Goethe%20University%20Frankfurt.pdf.

efficiency.[104] Additionally, Hasbrouck and Saar (2012) found evidence that "[HFT] activity improves traditional market quality measures."[105]

2) HFT Impact on Volatility

An initial review of illustrative empirical findings suggests that concerns that HFT strategies increase stock price volatility are misplaced. For example, Figure 1.8 above illustrates that intraday volatility, i.e. percent change between daily low and daily high, is below its historical average.[106] These results suggest that HFT strategies are not appreciably increasing intraday volatility, although they do not necessarily mean that HFT strategies reduce volatility. In addition, Gao and Mizrach (2013) found that the frequency of "market quality breakdowns," defined as a decline of 10% or more below the 9:35am price, followed by a reversion to within 2.5% of that price, have declined over time.[107] Indeed, academics generally agree that during normal periods of market activity, HFT strategies dampen volatility in the equity markets (see, e.g., Gomber et al. (2011), Jones (2013) and Angel et al. (2011, 2013)).

Despite the majority view regarding HFT's positive impact on volatility, the academic literature includes some dissenters. Zhang (2010) and Cartea and Penalva (2012) conclude that HFT strategies are associated with increases in volatility.[108] It should be noted, however, that those conclusions are based on a theoretical approach. Those negative theoretical assertions are countered by the empirical

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[104] Austin Gerig, *High-Frequency Trading Synchronizes Prices in Financial Markets* (DERA Working Paper, 2015), *available at* http://www.sec.gov/dera/staff-papers/working-papers/dera-wp-hft-synchronizes.pdf.

[105] Joel Hasbrouck & Gideon Saar, *Low-Latency Trading* (Johnson School Research Paper Series No. 35-2010, 2013), *available at* http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1695460.

[106] *See supra* Figure 1.8.

[107] Cheng Gao & Bruce Mizrach, Market Quality Breakdowns in Equities (2015), *available at* http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2153909.

[108] *See* Frank Zhang, *The Effect of High-Frequency Trading on Stock Volatility and Price Discovery* (2010), *available at* http://mitsloan.mit.edu/groups/template/pdf/Zhang.pdf; Alvaro Cartea & Joe Penalva, *Where is the Value in High Frequency Trading?* (2010), *available at* http://www.cftc.gov/idc/groups/public/@swaps/documents/dfsubmission/tacpresentation030111_acjp.pdf.

work of Brogaard (2010), Angel et al. (2013) and Jones (2013), each finding that HFT dampens volatility based on empirical results.

Indeed, no empirical evidence supports the claim that HFT strategies increase the volatility of equity prices during periods of normal market activity, although certain studies have found that HFT strategies may increase the volatility of equity prices during extreme market events (see, e.g., Kirilenko et al. (2014) and Angel et al. (2013)).[109]

A related criticism of HFT strategies is that they can create extreme price swings through "fleeting liquidity," in which high speed order updates can cause "a false sense of overpriced supply and demand for a stock."[110] As a result, market participants may act under the impression that liquidity exists, when it actually does not. Fleeting liquidity is said to cause "mini crashes," in which stock prices undergo dramatic price swings followed by corrections within a short period of time.[111]

Empirical studies of this phenomenon do not demonstrate a clear connection between HFT strategies and "fleeting liquidity." For example, Golub et al. (2012) conclude that frequent quote updating can produce fleeting liquidity, which in turn creates large, rapid fluctuations in price.[112] However, Golub's analysis focuses on a standard data set that does not distinguish between HFT and non-HFT trading strategies. Brogaard et al. (2015), who analyze a proprietary data set that *does* differentiate between HFT strategies and non-HFT strategies, obtain different results. They find that traders using HFT strategies are net liquidity providers in

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[109] *See* Andrei Kirilenko et al., *The Flash Crash: The Impact of High Frequency Trading on an Electronic Market* (2014), *available at* http://www.cftc.gov/idc/groups/public/@economicanalysis/documents/file/oce_flashcrash0314.pdf.

[110] *See, e.g.*, Anton Golub et al., *High Frequency Trading and Mini Flash Crashes* 16 (Working Paper, 2012), *available at* http://arxiv.org/pdf/1211.6667.pdf.

[111] *See id.*; *see also* Michael Kling, *A Dozen Mini Flash Crashes Hit Stock Market Daily*, CNNMONEY (Mar. 21, 2013), *available at* http://www.newsmax.com/finance/InvestingAnalysis/flash-crash-stocks-mini-SEC/2013/03/21/id/495652/?s=al.

[112] *See* Golub et al., *supra* note 110.

the immediate aftermath of an extreme price movement, and that they are *not* net liquidity demanders preceding an extreme price movement. In other words, those using HFT strategies do not trigger extreme price movements by entering aggressive liquidity-demanding orders, and do not—as a group—withdraw liquidity immediately after extreme price movements.[113]

3) HFT Impact on Liquidity

In general, the academic literature on HFT strategies finds that they contribute positively to the liquidity of equity markets. Jones (2013) notes that the vast majority of empirical work on HFT strategies shows that they improve market liquidity. Other research has found that HFT strategies generally contribute liquidity to the market when liquidity is in short supply and consume liquidity from the market when there is an over-supply, thus smoothing equity market liquidity overall (see e.g. Carrion (2013)). Brogaard et al. (2014) further confirm that market participants using HFT strategies "supply liquidity in stressful times such as the most volatile days and around macroeconomic news announcements."[114] Overall, the majority of the academic literature support the view that HFT strategies have a positive impact on market liquidity in a number of respects.

4) HFT Impact on Price Discovery

Improvement in the efficiency of price discovery is another positive impact of HFT strategies generally supported by the empirical literature. Brogaard et al. (2014) found that "overall HFT strategies facilitate price efficiency by trading in the direction of permanent price changes and in the opposite direction of transitory pricing errors."[115] A review of the academic literature by Gomber et al. (2011) also found that the vast majority of papers on HFT strategies conclude that HFT strategies improve price formation.[116] The conclusion is supported by Carrion (2013), who determines that "[p]rices incorporate information flow from order

[113] Jonathan Brogaard et al., *High-Frequency Trading and Extreme Price Movements* (2015), *available at* http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2531122.
[114] Jonathan Brogaard et al., *High-Frequency Trading and Price Discovery*, 27 REVIEW OF FINANCIAL STUDIES 2267 (2014), *available at* http://faculty.haas.berkeley.edu/hender/hft-pd.pdf.
[115] *Id.*
[116] Gomber et al., *supra* note 103.

flow and market-wide returns more efficiently on days when HFT participation is high,"[117] and by Biais and Wooley (2011), who find that "HFT [activity] improves informational efficiency…[and] enhances price discovery."[118]

5) HFT Strategies and the "Arms Race"

Another concern about HFT strategies involves the so-called arms race among firms that use HFT strategies, whereby competitors engage in an escalating rivalry to trade faster than other market participants.

The underlying concern is that the arms race would reduce competition among liquidity providers (see, e.g., Angel et al. (2013), Budish et al. (2015), Biais et al. (2011), Harris (2013), Chordia et al. (2013)).[119] Harris (2013) notes that "[m]arkets need to be slowed, but not because HFT [activity] is dangerous. Markets need to be slowed slightly to wisely stop an arms race that will eventually decrease competition…and thereby increase investor transaction costs."[120] Angel et al. (2013) also express a concern that the expense for technologies necessary to compete at high speeds could become a significant barrier to entry that will reduce competition and potentially increase transaction costs.

However, despite the concerns about the arms race, there is no empirical evidence that the proposed consequences have materialized. Given that competition has not clearly been reduced to deleterious levels, it is important not to introduce proactive measures that may have unintended consequences on an otherwise well-performing market (see Harris (2013), noting that imposing

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[117] Allen Carrion, *Very Fast Money: High-Frequency Trading on the NASDAQ,* 16 J. FINANCIAL MARKETS 680, 710 (2013), *available at* http://www.business.unr.edu/faculty/liuc/files/RUC/topic_limitorderbook/Carrion_2013.pdf.

[118] Bruno Biais & Paul Woolley, *High Frequency Trading,* 14 (2011) (unpublished manuscript), *available at* http://www.cifr.eu/files/file2220879.pdf.

[119] Eric Budish et al., *The High Frequency Trading Arms Race: Frequent Batch Auctions as a Market Design Response* (2015) , *available at* https://faculty.chicagobooth.edu/eric.budish/research/HFT-FrequentBatchAuctions.pdf; Tarun Chordia et al., *High Frequency Trading*, 16 THE JOURNAL OF FINANCIAL MARKETS 637 (2013).

[120] Larry Harris, *What to Do about High-Frequency Trading*, CFA INST. (Apr. 24 2013), *available at* https://blogs.cfainstitute.org/investor/2013/04/24/what-to-do-about-high-frequency-trading/.

minimum standing times for orders would "have the unintended effect of increasing transaction costs for public investors").[121]

6) HFT Strategies and "Rent-Seeking" Behavior

Some commenters have expressed concern that HFT strategies can yield outsize profits, and that these profits represent rent-seeking behavior that extracts value from other market participants without improving market quality.[122]

Again, a preliminary investigation of empirical findings suggests that this criticism is not well-founded. For example, Figures 1.9 and 1.10 above show that increases in depth and declines in bid-ask spreads have accompanied the rise of automated trading—these results provide tentative evidence of improvements in market quality. Data regarding the profits attributable to HFT strategies also appear to undermine the "rent-seeking" theory. For example, the TABB Group estimates that the aggregate profits earned by firms employing HFT strategies declined from around $7.2 billion in 2009 to $1.3 billion in 2014.[123] More recent data show that that the average profit per traded share earned by firms using HFT strategies has halved in recent years, from a tenth of a penny in 2009 to a twentieth of a penny in 2015.[124]

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[121] *Id.*

[122] *See, e.g.*, PETER SWANN, COMMON INNOVATION: HOW WE CREATE THE WEALTH OF NATIONS 121 (Dec. 17, 2014); Mark Hutchinson, *High Frequency Trading: Wall Street's New Rent-Seeking Trick*, MONEY MORNING, (Aug. 14, 2009), *available at* http://www.moneymorning.com/2009/08/14/high-frequency-trading/.

[123] Larry Tabb, *No, Michael Lewis, the US Equities Market Is Not Rigged*, TABB GROUP (Mar. 31, 2014), *available at* http://tabbforum.com/opinions/no-michael-lewis-the-us-equities-market-is-not-rigged?print_preview=true&single=%20true.

[124] Orcun Kaya, *High-frequency Trading*, Deutsche Bank, 3 (May 24, 2016) (citing Rosenblatt Securities), *available at* https://www.dbresearch.com/PROD/DBR_INTERNET_EN-PROD/PROD0000000000406105/High-frequency_trading%3A_Reaching_the_limits.pdf.

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CHAPTER 2: TRADING VENUES AND UNDISPLAYED LIQUIDITY

Part I describes the rules applicable to the two types of trading venues: exchanges and ATSs. It also describes the process of broker-dealer internalization. Part I then sets forth proposed reforms to exchanges and ATSs. Part II describes undisplayed or "dark" liquidity, including a review of the academic literature on the relationship between "dark" liquidity and market quality. Part II then sets forth specific recommendations related to "dark" liquidity.

Part I: Regulating Different Types of Trading Venues

A. Exchanges

The Exchange Act defines an exchange as "any organization, association, or group of persons, whether incorporated or unincorporated, which constitutes, maintains, or provides a market place or facilities for bringing together purchasers and sellers of securities."[125] The Exchange Act provides that an exchange may seek to register as a "national securities exchange" by publicly filing an application with the SEC.[126] Throughout this report we use the term "exchange" to refer to a trading venue that has registered as a national securities exchange with the SEC.

Twelve exchanges are currently in operation. They are estimated to collectively handle approximately 63% of the total share volume of executions in equities in the United States.[127] ICE/NYSE, NASDAQ OMX, and BATS are the three exchange groups that execute the vast majority of this trading volume.[128] These three groups collectively control ten of the twelve exchanges; CHX and

[125] 15 U.S.C. § 78c(a)(1) (2012).
[126] 15 U.S.C. § 78f (2010).
[127] *See* TABB Group, Equities LiquidityMatrix May 2016, *available at* http://mm.tabbforum.com/liquidity_matrices/187/documents/original_2016-05_Equities_Liquidity_Matrix_May_2016.pdf.
[128] Memorandum from SEC Division of Trading and Markets to SEC Market Structure Advisory Committee, Rule 611 of Regulation NMS, U.S. SEC. & EXCH. COMM'N 16 (Apr. 30, 2015), *available at* https://www.sec.gov/spotlight/emsac/memo-rule-611-regulation-nms.pdf.

NSX constitute the remaining two as "non-group" exchanges.[129] In addition, the SEC approved the exchange application of Investors Exchange (**"IEX"**), currently an ATS, in June 2016.[130]

The requirements that apply to exchanges are set forth in the Exchange Act and in regulations promulgated thereunder by the SEC. The Exchange Act requires that exchanges permit any registered broker-dealer (or individual associated with a broker-dealer) in good standing to become a member of the exchange.[131] The Exchange Act also requires that each exchange have the capacity to carry out the purposes of the Exchange Act and to enforce compliance by its members with the Act and its related rules.[132] Such enforcement is generally achieved through disciplinary proceedings and membership restrictions, for which the Exchange Act also sets forth guidelines.[133] In furtherance of their enforcement responsibilities, exchanges are statutorily deemed to be "self-regulatory organizations" (**"SROs"**). They are the only type of trading venue so designated.[134]

Of course, exchanges also have their own rules that apply to their broker-dealer members. Exchange rules govern a wide range of details about their operations, from the types of trading services that they provide to the fees that they charge their broker-dealer members.[135] The Exchange Act sets forth specific parameters for the contents of exchange rules. These include the requirement that the rules "are designed to… remove impediments to and perfect the mechanism of a free and open market and a national market system…to protect investors and the

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[129] *Id.*; *Market Value Summary*, BATS TRADING, *available at* http://www.batstrading.com/market_summary.
[130] *See* In the Matter of the Application of Investors' Exchange, LLC for Registration as a National Securities Exchange, Exchange Act Release No. 78101, File No. 10-222 (Jun. 17, 2016), *available at* https://www.sec.gov/rules/other/2016/34-78101.pdf.
[131] 15 U.S.C. § 78f(b)(2) (2010).
[132] 15 U.S.C. § 78f(b)(1) (2010).
[133] 15 U.S.C. § 78f(c),(d) (2010).
[134] 15 U.S.C. § 78s(a) (2010). *See infra* note 220 . As discussed in greater detail below, "national securities associations" (i.e., FINRA) may also be self-regulatory organizations.
[135] Concept Release on Equity Market Structure, Exchange Act Release No. 61358, File No. S7-12-98 16 (Jan. 14, 2010), *available at* https://www.sec.gov/rules/concept/2010/34-61358.pdf.

public interest; and are not designed to permit unfair discrimination between customers, issuers, brokers, or dealers…."[136]

The Exchange Act also determines the process by which an exchange may change its trading rules. First, exchange rules are generally subject to the SEC's review and approval before they go into effect.[137] Second, a proposed rule change must be publicly filed on a Form 19b-4 "in a clear and comprehensible manner, to enable the public to provide meaningful comment on the proposal…"[138] Third, exchanges are required to post a current and complete list of their rules on their own websites.[139]

Importantly, exchange registration provides certain regulatory advantages. For example, exchanges are exempt from paying clearing fees for executing a trade whereas ATSs and broker-dealer internalizers must pay such fees. Additionally, Rule 611 of Reg NMS (also referred to as the "order protection rule" and discussed further in Chapter 3) encourages the public display of orders on exchanges, because the rule provides publicly displayed orders on exchanges with "price protection." This means that a broker-dealer is required to send orders for a stock to an exchange with the best publicly displayed price for that stock if the broker-dealer cannot otherwise match or improve on that price.[140]

Exchanges also derive certain benefits from their status as SROs. For example, exchanges receive certain types of legal immunity as SROs. SROs are also the only types of entities that may control and operate the Securities Information Processors (**"SIPs"**), from which other market participants are required to purchase market data. Although the SEC reviews the fees charged by

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[136] 15 U.S.C. 78f(b)(5) (2010).

[137] 15 U.S.C. § 78s(b) (2010). The SEC generally has 45 days to approve, disapprove, or institute proceedings to determine whether the rule change should be approved, subject to a potential 45 day extension.

[138] SEC Form 19b-4, *available at* https://www.sec.gov/about/forms/form19b-4.pdf.

[139] 17 C.F.R. §§ 240.19b-4(l) and (m) (2013).

[140] Rule 611 of Reg NMS; Memorandum from SEC Division of Trading and Markets to SEC Market Structure Advisory Committee, Current Regulatory Model for Trading Venues and for Market Data Dissemination, U.S. SEC. & EXCH. COMM'N 5 (Oct. 20, 2015), *available at* https://www.sec.gov/spotlight/emsac/memo-regulatory-model-for-trading-venues.pdf.

the SIPs, the exchanges are still able to charge broker-dealers high fees for accessing market data.[141]

Exchanges' status as SROs also allows them to establish market-wide rules through the use of national market system plans or "NMS Plans." For example, SROs are designing and will implement the Consolidated Audit Trail (**"CAT"**) via an NMS Plan.[142] The CAT will allow regulators to more easily and accurately survey quoting and trading activity across the marketplace. However, the implementation and reporting requirements for the CAT will require operational changes not only by exchanges, but will also impose significant regulatory burdens on broker-dealers. However, due to their influence over NMS Plans, exchanges have disproportionate input into and oversight of the CAT planning process. These and other legal and practical implications of SRO status will be addressed in further detail later in this Chapter.

It is important to note that certain aspects of Reg NMS may have lowered the barriers to entry for new and smaller exchanges.[143] For example, because the order protection rule protects the publicly displayed quotes of any exchange (regardless of its trading volume), the rule helps to ensure that even small exchanges can attract order flow by displaying the best prices.[144] For example,[145] as of June 2016, CHX had a market share of only 0.34% of the trading volume in NASDAQ stocks and 0.25% of the trading volume in NYSE stocks.[146]

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[141] Memorandum from SEC Division of Trading and Markets to SEC Market Structure Advisory Committee, Current Regulatory Model for Trading Venues and for Market Data Dissemination, U.S. SEC. & EXCH. COMM'N 6 (Oct. 20, 2015), *available at* https://www.sec.gov/spotlight/emsac/memo-regulatory-model-for-trading-venues.pdf.
[142] Chapter 3 of this Report addresses the CAT in further detail.
[143] Memorandum from SEC Division of Trading and Markets to SEC Market Structure Advisory Committee, Rule 611 of Regulation NMS, U.S. SEC. & EXCH. COMM'N 16 (Apr. 30, 2015), *available at* https://www.sec.gov/spotlight/emsac/memo-rule-611-regulation-nms.pdf.
[144] *Id.* at 16 n.27, citing to Regulation NMS Adoption Release, 70 FR at 37607. The Order Protection Rule is described in greater detail in Chapter 3.
[145] *See also id.* at 16.
[146] Data *available at* https://batstrading.com/market_summary/. *See also id.* at 10-11.

B. Alternative Trading Systems (ATSs)

In 1998, the SEC passed Regulation Alternative Trading System (**"Reg ATS"**) and established a new type of trading venue, the ATS. This new type of trading venue was created to respond to the proliferation of automated trading platforms that market participants had developed in recent years. In particular, market participants had successfully applied technological advancements to build electronic platforms that "furnish[ed] services traditionally provided solely by registered exchanges."[147] At the time of Reg ATS's adoption, ATSs had a market share of over 20% of the order volume in NASDAQ-listed securities (NASDAQ was not an exchange at that time) and 4% of order volume in exchange-listed securities.[148]

Importantly, Reg ATS established that trading venues could be exempt from exchange registration, if they complied with Reg ATS and were regulated as broker-dealers. However, any venue registering as an ATS could *not* exercise self-regulatory powers, such as making rules regarding subscriber conduct outside the platform. Thus, in adopting Reg ATS, the SEC presented trading venues with two regulatory options: (1) register as a national securities exchange; or (2) register as broker-dealers, and comply with the requirements of ATSs, as described below.[149]

Today, there are roughly 40 ATSs that are estimated to collectively execute approximately 15% of the total U.S. share volume in equities.[150]

1) Key Provisions of Reg ATS

An ATS must file with the SEC an initial operation report on a Form ATS, which it must later amend whenever there is a material change to the operation of

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[147] Regulation of Exchanges and Alternative Trading Systems, Exchange Act Release No. 40760, File No. S7-12-98 (Dec. 8, 1998), *available at* https://www.sec.gov/rules/final/34-40760.txt.
[148] *Id.*
[149] *Id.*
[150] *See* TABB Group, Equities LiquidityMatrix May 2016, *available at* http://mm.tabbforum.com/liquidity_matrices/187/documents/original_2016-05_Equities_Liquidity_Matrix_May_2016.pdf.

the ATS.[151] The Form ATS includes information regarding the details of how the ATS operates, its subscribers, the types of securities it trades, and its procedures for reviewing systems capacity.[152] Importantly, "Form ATS is not an application and the [SEC] would not 'approve' an ATS before it began to operate. Form ATS is, instead, a notice to the [SEC]."[153] ATSs are therefore able to effect trading rules without the SEC's pre-approval. Form ATSs and amendments thereto are also "deemed confidential when filed."[154] The rules an ATS establishes must pertain solely to the trading conduct of the users of its platform[155] and ATSs can only discipline subscribers by excluding them from trading.[156]

The operators of ATSs must be registered as broker-dealers under Section 15 of the Exchange Act.[157] Broker-dealers must also be members of FINRA, subject to few exceptions.[158] In practice, a broker-dealer that operates an active ATS cannot qualify for these exceptions, so all ATS operators are members of FINRA.[159] ATS operators are subject to regular audits and examinations by FINRA.

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[151] 17 C.F.R. § 242.301(b)(2) (2009).
[152] Regulation of Exchanges and Alternative Trading Systems, 63 Fed. Reg. 70844, 70863-864 (Dec. 22, 1998), *available at* https://www.gpo.gov/fdsys/pkg/FR-1998-12-22/pdf/98-33299.pdf.
[153] *Id.* at 70864.
[154] 17 C.F.R. § 242.301(b)(2)(vii) (2009).
[155] 17 C.F.R. § 242.300 (2009).
[156] *Id.*
[157] 17 C.F.R. § 242.301(b)(1) (2009).
[158] *See, e.g.*, *Brokers*, FINRA, *available at* http://www.finra.org/investors/brokers. Exchange Act Sec. 15(b)(8) provides "It shall be unlawful for any registered broker or dealer to effect any transaction in, or induce or attempt to induce the purchase or sale of, any security (other than or commercial paper, bankers' acceptances, or commercial bills), unless such broker or dealer is a member of a securities association registered pursuant to section 15A of this title or effects transactions in securities solely on a national securities exchange of which it is a member.
[159] Pursuant to Exchange Act Sec. 15(b)(8), ATS operators must register as members of a national securities association, i.e. FINRA, because they do not effect transactions solely over an exchange. There is also a limited exemption from registration under Rule 15b9-1, whereby broker-dealers may avoid registration if it (1) is a member of a national securities exchange, (2) carries no customer accounts, and (3) has annual gross income derived from purchases and sales of securities otherwise than on a national securities exchange of which it is a member in an amount no greater than $1,000. An active ATS would not satisfy prongs (2) and/or (3) of the exemption.

ATSs are not required to publicly display orders, unless their trading volume exceeds a specified threshold *and* the ATS displays prices to more than one of its participants (i.e., it is not a "dark pool").[160] If an ATS is a dark pool, then there is no regulatory threshold at which the ATS must publicly display orders. It is important to note that virtually all ATSs are dark pools.

If the ATS is not a dark pool, then it must publicly display orders in an NMS stock[161] (and report them for inclusion in the SIP) "if during four or more of the preceding six months the ATS had an average daily trading volume of 5% or more of the average daily share volume" for that stock.[162] For trades that fall below this volume threshold, ATSs do not need to report their quotations for inclusion in consolidated market data.[163]

Unlike exchanges, ATSs are not required to provide all broker-dealers in good standing with access to trade on their platform. However, there is a limitation on an ATS's ability to restrict access to their platform. More specifically, an ATS must provide "fair access" to trade in a stock on its system to any market participant if, during four or more of the preceding six months, the ATS had an average daily trading volume of 5% or more of the average daily share volume for

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[160] Memorandum from SEC Division of Trading and Markets to SEC Market Structure Advisory Committee, Current Regulatory Model for Trading Venues and for Market Data Dissemination, U.S. SEC. & EXCH. COMM'N 4 (Oct. 20, 2015), *available at* https://www.sec.gov/spotlight/emsac/memo-regulatory-model-for-trading-venues.pdf.

[161] Rule 600(b)(46) of Reg NMS defines NMS security as "any security or class of securities for which transaction reports are collected, processed, and made available pursuant to an effective transaction reporting plan…," and Rule 600(b)(47) defines NMS stock as an NMS security other than an option. 17 C.F.R. § 242.600 (2005). *See also* Memorandum from SEC Division of Trading and Markets to SEC Market Structure Advisory Committee, Rule 611 of Regulation NMS, U.S. SEC. & EXCH. COMM'N 3 (Apr. 30, 2015) ("An NMS stock generally means any exchange-listed security (other than listed options) for which consolidated market data is disseminated.").

[162] 17 C.F.R. §§ 242.301(b)(3) and (5) (2009).

[163] 17 C.F.R. § 242.301(b)(3) (2009). Pursuant to sub-section (A), the ATS must "display subscriber orders to any person (other than ATS employees)" in order for this obligation to be triggered. Qualifying broker-dealers must also have access to the exchange to which the data is reported.

that stock.[164] Providing fair access requires that the ATS: (1) establish written standards for granting access to trading; and (2) not unreasonably limit anyone's access to trading by applying those standards in an unfair or discriminatory way.[165]

Importantly, quotes displayed solely at ATSs are not subject to price protection under the order protection rule. As discussed in Chapter 3, "protected quotations" are defined in Reg NMS as the best bid or offer on an exchange or FINRA.[166] As a result, quotes on ATSs only become "protected quotations" if an ATS reports them to the Alternative Display Facility (**"ADF"**) operated by FINRA.[167] The ADF is a "display only facility and does not provide automated order routing functionality, execution facilities, or linkages between ADF trading centers."[168]

C. Broker-Dealer Internalization

A substantial volume of trade executions take place via broker-dealer internalization, not on an exchange or ATS. This trading activity generally involves a broker-dealer systematically executing customer orders as a principal, against the broker-dealer's own inventory of stocks. Today, approximately 22% of the total U.S. share volume in equities is estimated to be executed in this manner.[169] And according to Chair White, approximately 250 broker-dealers

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[164] 17 C.F.R. § 242.301(b)(5) (2009). The Fair Access Rule applies on a "security-by security basis." *See* Regulation of Exchanges and Alternative Trading Systems, 63 Fed. Reg. 70844, 70873 (Dec. 22, 1998), *available at* https://www.gpo.gov/fdsys/pkg/FR-1998-12-22/pdf/98-33299.pdf.

[165] 17 C.F.R. § 242.301(b)(5)(ii)(C) and (d) also establish related record-keeping and reporting requirements.

[166] Memorandum from SEC Division of Trading and Markets to SEC Market Structure Advisory Committee, Current Regulatory Model for Trading Venues and for Market Data Dissemination, U.S. SEC. & EXCH. COMM'N 5 (Oct. 20, 2015), *available at* https://www.sec.gov/spotlight/emsac/memo-regulatory-model-for-trading-venues.pdf. Regulation NMS defines "protected quotation" to be the best bid or offer at an exchange or national securities association (i.e., FINRA).

[167] *Id.*

[168] *Id.* (citing to *Alternative Display Facility (ADF)*, FINRA, *available at* http://www.finra.org/industry/adf).

[169] *See* TABB Group, Equities LiquidityMatrix May 2016, *available at* http://mm.tabbforum.com/liquidity_matrices/187/documents/original_2016-

internalize customer orders.[170] Indeed, broker-dealer internalization is common across securities markets and existed in the manual market era.

Importantly, broker-dealer internalizers do not meet the Exchange Act definition of an "exchange," because they generally execute trades as principal rather than acting as a liaison that connects buyers with sellers of stocks. However, broker-dealer internalizers are, of course, required to register as members of FINRA.[171] FINRA membership carries with it a number of regulatory obligations, such as examination, licensing, and reporting requirements.[172] Many broker-dealer internalizers are also subject to regulation as "OTC market makers."[173] OTC market makers must file Rule 605 execution quality reports, like trading venues.[174] Other broker-dealers are not required to file this type of report. In addition, all broker-dealer internalizers are subject to the order protection rule, which requires execution of customer orders only at the NBBO or better.[175]

1) Broker-Dealer Internalization of Retail Orders and Payment for Order Flow

Nearly 100% of retail orders to buy or sell NMS stocks at the best publicly available price ("marketable orders") are executed via "retail" broker-dealer internalization.[176] Retail broker-dealer internalizers typically have payment for

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05_Equities_Liquidity_Matrix_May_2016.pdf; CCMR staff analysis of FINRA OTC (Non-ATS) Transparency Data, *available at* https://otctransparency.finra.org/.

[170] Mary Jo White, Chair, U.S. SEC. & EXCH. COMM'N, Speech at the Sandler O'Neill & Partners, L.P. Global Exchange and Brokerage Conference, Enhancing Our Equity Market Structure (Jun. 5, 2014), *available at* https://www.sec.gov/News/Speech/Detail/Speech/1370542004312..

[171] *See, e.g.*, *Brokers*, FINRA, *available at* http://www.finra.org/investors/brokers.

[172] *Id.*

[173] 17 C.F.R. § 242.600(b)(52) (2005).

[174] OTC market makers are considered "market centers" under Regulation NMS. *See* 17 C.F.R. § 242.600(b) (38),(52) (2005). Market centers are required to produce Rule 605 reports. *See* 17 C.F.R. § 242.605 (2005).

[175] 17 C.F.R. § 242.611(a) (2005).

[176] Memorandum from SEC Division of Trading and Markets to SEC Equity Market Structure Advisory Committee, Certain Issues Affecting Customers in the Current Equity Market Structure, U.S. SEC. & EXCH. COMM'N 2 (Jan. 26, 2016), *available at* https://www.sec.gov/spotlight/equity-market-structure/issues-affecting-customers-emsac-012616.pdf (referring to Concept Release on Equity Market Structure, Exchange Act Release

order flow (**"PFOF"**) agreements with retail brokerages. Under a typical PFOF agreement, a broker-dealer internalizer pays a retail brokerage to direct marketable order flow to the broker-dealer internalizer.[177] Broker-dealer internalizers enter into such agreements to attract customer order flow that might otherwise be routed elsewhere for execution. For example, a broker-dealer internalizer might pay a retail brokerage (such as E*TRADE, TD Ameritrade or Charles Schwab) roughly 0.1 cent per share or less in exchange for that brokerage's retail orders.[178] Pursuant to Rule 606 of Reg NMS, retail brokerages must publicly disclose information about their PFOF arrangements in quarterly public filings.[179] In Chapter 3, we describe these and other Reg NMS disclosure obligations in greater detail.

Retail broker-dealer internalizers are often able to provide retail orders with immediate execution at a price better than the NBBO. Indeed, PFOF agreements often guarantee a specified amount of average price improvement for executions of the retail order flow.[180] PFOF agreements generally allocate the cost savings

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No. 61358, File No. S7-12-98 20 (Jan. 14, 2010), *available at* https://www.sec.gov/rules/concept/2010/34-61358.pdf). A marketable order is an order to buy or sell a stock at the best publicly displayed price. *See also* Concept Release on Equity Market Structure, Exchange Act Release No. 61358, File No. S7-02-10, 75 Fed. Reg. 3594, 3600 (proposed Jan. 21, 2010).

[177] *See, e.g.*, Memorandum from SEC Division of Trading and Markets to SEC Market Structure Advisory Committee, Certain Issues Affecting Customers in the Current Equity Market Structure, U.S. SEC. & EXCH. COMM'N 5 (Jan. 26, 2015), *available at* https://www.sec.gov/spotlight/equity-market-structure/issues-affecting-customers-emsac-012616.pdf.

[178] *See, e.g.*, E*TRADE, *SEC Rule 606 Disclosure* (2016), *available at* https://content.etrade.com/etrade/powerpage/pdf/OrderRouting11AC6.pdf; TD Ameritrade Clearing, Inc., *SEC Rule 606 Report* (2016), *available at* https://www.tdameritrade.com/retail-en_us/resources/pdf/AMTD2054.pdf; Charles Schwab Corporation, *Report on Routing Customer Orders for Quarter Ending March 31. 2016* (2016), *available at* http://www.schwab.com/public/schwab/nn/legal_compliance/important_notices/order_routing.html.

[179] 17 C.F.R. § 242.606(a)(1)(iii) (2005).

[180] *See* Memorandum from SEC Division of Trading and Markets to SEC Market Structure Advisory Committee, Certain Issues Affecting Customers in the Current Equity Market Structure, U.S. SEC. & EXCH. COMM'N 6 (Jan. 26, 2015), *available at* https://www.sec.gov/spotlight/equity-market-structure/issues-affecting-customers-emsac-012616.pdf.

attributable to price improvement among the broker-dealer internalizer, retail brokerage, and retail investor.[181]

As discussed in Chapter 1, our empirical analysis finds that internalized customer orders do in fact receive price improvement.[182] Another empirical study shows that the execution quality provided by OTC market makers was recently at an "all-time high."[183] Therefore, we generally believe that broker-dealer internalization of customer orders is a form of order execution that should be preserved. However, in Chapter 3 we recommend certain reforms applicable to all broker-dealers, including those that internalize order flow. In particular, we support enhancements to broker-dealer disclosures regarding retail and institutional orders that would enhance customers' ability to monitor and respond to their broker-dealers' performance.

D. Different Regulatory Regimes for Exchanges and ATSs

The U.S. equity markets' competitive landscape is in many ways driven by the SEC's bifurcation of trading venues into two distinct regulatory regimes: exchanges and ATSs. In this section, we evaluate this structure and do not treat the regulatory segregation of exchanges and ATSs as a foregone conclusion. To assess whether the current regime is appropriate, we focus on differences between exchanges and ATSs. First, we consider the ability of ATSs to limit access to trading on their platforms. Second, we evaluate the ability of ATSs to enact trading rules without the SEC's prior review and approval.

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[181] *See generally* Robert H. Battalio & Tim Loughran, *Does Payment For Order Flow To Your Broker Help Or Hurt You?*, 80 T. J BUS ETHICS 37 (2008).
[182] *See supra* Figure 1.11 and surrounding discussion.
[183] Luis A. Aguilar, Commissioner, U.S. SEC. & EXCH. COMM'N, Public Statement, U.S. Equity Market Structure: Making Our Markets Work Better for Investors (May 11, 2015), *available at* https://www.sec.gov/news/statement/us-equity-market-structure.html (quoting *U.S. Equity Market Structure: Q4-2014 TABB Equity Digest* (Apr. 7, 2015), *available at* http://www.tabbgroup.com/PublicationDetail.aspx?PublicationID=1662).

1) Trading Venues' Access Rules

One basic difference between exchanges and ATSs is each venue's access rules. As described above, exchanges are generally required to provide fair access to all broker-dealers seeking to trade on their platform.[184] In contrast, ATSs may select which market participants may access their platforms. In our view, ATSs' ability to offer price improvement to the best publicly displayed price may relate to their ability to limit access to their platform.

First, ATSs are able to quickly limit the access of traders who create a hostile trading environment for other subscribers. For example, some market participants may employ trading strategies that are aggressive or potentially adverse to other subscribers, but their behavior may not rise to the level of abuse or manipulation that could disqualify them from exchange membership. ATSs have broad discretion to deny access to any participants, so they can quickly exclude these market participants from their venue.[185]

Second, certain execution strategies for investor orders may be more efficiently deployed on a trading venue that only includes a specific sub-set of market participants. For example, large institutional investors may benefit from having their orders executed on a venue that only includes other large institutional investors. Therefore, ATSs' ability to exercise discretion as to who may gain

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[184] It is important to reiterate that "fair" access nevertheless permits exchanges to reasonably exclude certain market participants under specific circumstances, such as the loss of good standing due to misconduct.

[185] Exchanges are required by the Exchange Act to provide substantial due process to members when prohibiting or limiting access. This requirement mandates notice, a hearing, a supporting statement prepared by the exchange, and also provides some SEC oversight. 15 U.S. Code § 78f(d) (2010). Additionally, exchanges' rules can provide significantly greater process, including the filing of complaints, answers, and various motions, as well as appeal processes. *See, e.g.*, NYSE Rules 9000-9870 *available at* http://nyserules.nyse.com/NYSE/Rules/. Conversely, ATSs are capable of summarily prohibiting or limiting subscriber access. *See, e.g.*, Barclays Capital Inc., Form ATS Barclays DirectEx (Jun. 30, 2015) ("Barclays retains the discretion to remove, revoke or limit a subscriber's access at any time without notice."), *available at* http://www.investmentbank.barclays.com/content/dam/barclayspublic/docs/investment-bank/equities/barclays-directex-form-ats-july-2015.pdf.

access to their platforms allows them to offer unique trading venues that cater to specific trading needs.

Although this report finds that ATSs in their current form can provide investors with measurable price improvement to the NBBO, our findings do not provide direct causal support between limited access and price improvement. If it were empirically demonstrated that limited access does *not* contribute to the reduction in investor transaction costs or otherwise improve investor outcomes, then we would support requiring ATSs to provide fair access.

Specific Recommendation:

1. ATSs should be allowed to limit access to their trading venues.[186]

2) Rulemaking Flexibility for ATSs

The requirements and processes associated with rulemaking at exchanges and ATSs diverge significantly. As SROs, exchanges have robust rulemaking and self-disciplinary authorities. These heightened regulatory authorities are associated with stringent requirements for the SEC review and approval of exchange rules. Exchanges must file proposed rule changes with the SEC for their review and approval before the rules are effective.[187] The SEC review process includes publication of the proposed rule with an opportunity for interested parties to comment on its contents.[188] In contrast, the rulemaking authorities of ATSs are narrowly circumscribed, and the processes associated with their rulemakings are limited. ATSs are not required to publicly release their Forms ATS and they are not required to obtain the approval of the SEC before enacting new trading rules.

ATS trading rules generally address technical details of the platform's operation and use. For example, they might establish order types or set forth the

[186] Citadel dissents from this recommendation.
[187] *See* Section 19(b)(1) of the Exchange Act.
[188] *Id.*

procedures that a subscriber would use to enter an order at the ATS.[189] If they regulate the conduct of members, they may only regulate behaviors pertaining to the use of the platform. For example, an ATS might establish a rule that subscribers can enter only bona fide bids or offers and may not engage in any deceptive acts on the platform.[190] In contrast, exchanges can regulate the off-exchange conduct of their members—for example, NYSE Rule 2210 establishes certain parameters for written communications between exchange members and institutional and retail investors.[191]

We believe that the existing rulemaking requirements that respectively apply to exchanges and ATSs remain appropriate and should not be changed. In particular, ATSs should not be required to obtain SEC pre-approval before they adopt trading rules. SEC review does not provide particular value in the design of technical and operational trading rules. Limited SEC resources should not be expended on an exacting review process of rules that are limited in scope and generally technical in nature.

In addition, investors can benefit from ATSs' rulemaking flexibility. The streamlined process allows ATSs to update their rules quickly and frequently. A simplified rulemaking procedure for smaller venues reduces start-up costs and facilitates innovation. As a result, smaller ATSs are better equipped to compete with large and incumbent exchanges. Investors can benefit from this increased competition: for example, it can drive the improvement of trading services offered to investors over time, consistent with the original policy behind the introduction of ATSs.[192] Furthermore, the relatively small market share of all ATSs and low

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[189] *See generally* IEX ATS Subscriber Manual Version 2.7, Updated: January 27, 2016; https://www.iextrading.com/docs/IEX+Subscriber+Manual.pdf.
[190] *See id.* at 25.
[191] NYSE Rule 2210, *available at* http://nyserules.nyse.com/nysetools/PlatformViewer.asp?SelectedNode=chp_1_20&manual=/nysc/rules/nyse-rules/.
[192] *See generally* Regulation of Exchanges and Alternative Trading Systems, Exchange Act Release No. 40760, File No. S7-12-98 (Dec. 8, 1998), *available at* https://www.sec.gov/rules/final/34-40760.txt.

trading volume of individual ATSs limits the risk of adverse effects from their trading rules.

Specific Recommendation:

2. ATSs should not be required to obtain pre-approval from the SEC before adopting trading rules.

E. Legal Issues regarding Exchanges and ATSs: Enhancing the Regulatory Framework

In this section, we consider instances of improper or illegal practices at certain ATSs and reforms that could help prevent such violations in the future. We then assess the status of exchanges as SROs and its implications, with related policy recommendations.

1) Enhancing the ATS Regulatory Structure: Measures to Improve ATS Transparency and Accountability

a) Concerns regarding Improper Activity by ATSs

As detailed in Part II of this Chapter, dark trading is often subject to public scrutiny because it is associated with a general lack of transparency. ATSs, which many know simply as "dark pools," are particular targets of such scrutiny. In some cases, these concerns appear to be well-founded—since 2011, several enforcement actions have exposed improper trading and disclosure practices at certain ATSs.[193]

[193] *See, e.g., In the Matter of ITG Inc. and Alternet Securities Inc.*, Securities Exchange Act Release No. 75672 (Aug. 12, 2015), *available at* https://www.sec.gov/litigation/admin/2015/33-9887.pdf; *In the Matter of UBS Securities LLC*, Securities Exchange Act Release No. 74060 (Jan. 15, 2015), *available at* http://www.sec.gov/litigation/admin/2015/33-9697.pdf; *In the Matter of LavaFlow, Inc.*, Securities Exchange Act Release No. 72673 (Jul. 25, 2014), *available at* http://www.sec.gov/litigation/admin/2014/34-72673.pdf; *In the Matter of Liquidnet, Inc.*, Securities Exchange Act Release No. 72339 (Jun. 6, 2014), *available at* http://www.sec.gov/litigation/admin/2014/33-9596.pdf; *In the Matter of eBX, LLC*, Securities Exchange Act Release No. 67969 (Oct. 3, 2012), *available at* http://www.sec.gov/litigation/admin/2012/34-67969.pdf; *In the Matter of Pipeline Trading*

These behaviors include: (i) the misuse of confidential customer information; (ii) false and/or incomplete disclosures; and (iii) pricing misconduct. In this section, we review the facts and legal bases of these enforcement actions, focusing on two recent actions by the SEC and the New York Attorney General (**"NYAG"**) against Credit Suisse (USA) LLC (**"Credit Suisse"**) and Barclays Capital Inc. (**"Barclays"**).[194]

i. *Misuse of Confidential Customer Information*

Reg ATS requires that ATSs establish "adequate safeguards and procedures to protect subscribers' confidential trading information."[195] Required safeguards include limiting access to customer information to ATS employees "who are operating the system or [are] responsible for its compliance with . . . applicable rules"[196] and "[i]mplementing standards controlling employees of the [ATS] trading for their own accounts."[197]

Two of the largest and most recent ATS settlements both involved claims relating to the misuse of confidential customer data, among other violations.[198] On January 31, 2016, Credit Suisse and Barclays each settled actions with the SEC and

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Systems LLC et al., Securities Exchange Act Release No. 65609, 10 (Oct. 24, 2011), *available at* https://www.sec.gov/litigation/admin/2011/33-9271.pdf.

[194] *See* Settlement Order, Credit Suisse Sec., LLC, Securities Act Release No. 10013, Exchange Act Release No. 77002, File No. 3-17078 (Jan. 31, 2016), *available at* https://www.sec.gov/litigation/admin/2016/33-10013.pdf; Settlement Order, Barclays Capital, Inc., Securities Act Release No. 10010, Exchange Act Release No. 77001, File No. 3-17077 6 (Jan. 31, 2016), *available at* https://www.sec.gov/litigation/admin/2016/33-10010.pdf.

[195] 17 C.F.R. § 242.301(b)(10)(i) (2009).

[196] 17 C.F.R. § 242.301(b)(10)(i)(A) (2009).

[197] 17 C.F.R. § 242.301(b)(10)(i)(B) (2009). Although the rule does not specifically reference the possibility that employees trading for their own account will misuse confidential information, the SEC's commentary on the rule notes that Rule 301(b)(10) requires ATSs to ensure that "procedures exist to ensure that employees of the alternative trading system cannot use such information for trading in their own accounts." Regulation of Exchanges and Alternative Trading Systems, 63 Fed. Reg. 70844, 70879 (Dec. 22, 1998).

[198] *See* Bradley Hope & Jenny Strasburg, *Credit Suisse, Barclays to Pay $154.3 Million to Settle 'Dark Pool' Investigations*, WALL ST. J. (Jan. 31, 2016), *available at* http://www.wsj.com/articles/credit-suisse-barclays-to-pay-about-150-million-to-settle-dark-pool-investigations-1454256877.

NYAG regarding these and other acts of misconduct at their respective ATSs. According to the SEC settlement order, Barclays allowed certain non-compliance employees to access confidential subscriber trading information on its ATS, Barclays LX.[199] At Credit Suisse, similar claims focused on the transfer of confidential subscriber information outside the ATS to other Credit Suisse systems.[200]

ii. *False Disclosures and Undisclosed Proprietary Trading Activity*

ATSs have also incurred liability for making false statements to investors and regulators, and for concealing the role of proprietary trading desks or other entities affiliated with the ATS. Such actions could constitute: (1) a failure to report material information in filings under Reg ATS[201] and (2) fraud under § 17(a) of the Securities Act.[202] Such actions could also violate New York's blue sky law, the Martin Act, under the premise that such actions misrepresent the character and safety of an ATS.[203]

The January 2016 settlements by Barclays and Credit Suisse each resolved alleged violations of Reg ATS, Section 17(a)(2) of the Securities Act, and New York's Martin Act.[204] According to the SEC, Credit Suisse failed to disclose or

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[199] Barclays Capital, Inc., Securities Act Release No. 10010, Exchange Act Release No. 77001, File No. 3-17077 3, 6, 12 (Jan. 31, 2016), *available at* https://www.sec.gov/litigation/admin/2016/33-10010.pdf.

[200] Credit Suisse Sec., LLC, Securities Act Release No. 10013, Exchange Act Release No. 77002, File No. 3-17078 3 (Jan. 31, 2016), *available at* https://www.sec.gov/litigation/admin/2016/33-10013.pdf.

[201] 17 C.F.R. § 242.301(b)(2) (2009).

[202] 15 U.S.C. § 77q (2010). This section governs the "[u]se of interstate commerce for [the] purpose of fraud or deceit."

[203] *People ex rel. Schneiderman v. Barclays Capital*, 1 N.Y.S.3d 910, 912 (2015).

[204] Settlement Agreement, Barclays PLC & Barclays Capital Inc. (Jan. 29, 2016), *available at* http://www.ag.ny.gov/pdfs/2016.2.1_Final_Signed_Barclays_Settlement_Agreement.pdf; Settlement Agreement, Credit Suisse Sec. (USA) LLC (Sept. 28, 2015), *available at* http://www.ag.ny.gov/pdfs/20160201_Fully_Executed_Settlement_Agreement_AES.PDF; Settlement Order, Credit Suisse Sec., LLC, Securities Act Release No. 10013, Exchange Act Release No. 77002, File No. 3-17078 (Jan. 31, 2016), *available at* https://www.sec.gov/litigation/admin/2016/33-10013.pdf; Settlement Order, Barclays Capital,

misrepresented to its ATS subscribers key information about their orders, including their categorization and where confidential information was transmitted.[205] The Barclays settlement similarly resolved charges relating to a number of material misrepresentations or omissions in violation of Section 17(a)(2).[206] For example, the SEC order states that Barclays failed to accurately inform subscribers of their likelihood of interacting with "aggressive" traders in the Barclays ATS and misrepresented the type of data feeds used to determine the NBBO in the ATS.[207] The order also states that Barclays violated Reg ATS by failing to disclose material changes to its ATS processes on Form ATS.[208]

iii. *Pricing Misconduct*

Enforcement actions against ATSs can also involve violations of Reg NMS Rule 612, which prohibits the "display, rank, or accept[ance]" of sub-penny orders,[209] and is described in detail in Chapter 3. For example, Credit Suisse was found to have violated Rule 612 in the SEC's January 2016 order instituting settlement proceedings.[210] According to the SEC, Credit Suisse "accepted, ranked and executed over 117 million illegal sub-penny orders" in its ATS.[211]

Inc., Securities Act Release No. 10010, Exchange Act Release No. 77001, File No. 3-17077 6 (Jan. 31, 2016), *available at* https://www.sec.gov/litigation/admin/2016/33-10010.pdf.

[205] Settlement Order, Credit Suisse Sec., LLC, Securities Act Release No. 10013, Exchange Act Release No. 77002, File No. 3-17078 4 (Jan. 31, 2016), *available at* https://www.sec.gov/litigation/admin/2016/33-10013.pdf.

[206] Settlement Order, Barclays Capital, Inc., Securities Act Release No. 10010, Exchange Act Release No. 77001, File No. 3-17077 6 (Jan. 31, 2016), *available at* https://www.sec.gov/litigation/admin/2016/33-10010.pdf.

[207] Press Release, U.S. SEC. & EXCH. COMM'N, Barclays, Credit Suisse Charged with Dark Pool Violations (Jan. 31, 2016), *available at* https://www.sec.gov/news/pressrelease/2016-16.html.

[208] Settlement Order, Barclays Capital, Inc., Securities Act Release No. 10010, Exchange Act Release No. 77001, File No. 3-17077 6 (Jan. 31, 2016), *available at* https://www.sec.gov/litigation/admin/2016/33-10010.pdf.

[209] *Id.*; Rule 612 of Regulation NMS.

[210] Settlement Order, Credit Suisse Sec., LLC, Securities Act Release No. 10013, Exchange Act Release No. 77002, File No. 3-17078 6 (Jan. 31, 2016), *available at* https://www.sec.gov/litigation/admin/2016/33-10013.pdf.

[211] Press Release, U.S. SEC. & EXCH. COMM'N, Barclays, Credit Suisse Charged with Dark Pool Violations (Jan. 31, 2016), *available at* https://www.sec.gov/news/pressrelease/2016-16.html; Settlement Order, Credit Suisse Sec., LLC, Securities Act Release No. 10013, Exchange Act

b) Proposed Amendments to Reg ATS and "Form ATS-N"

In November 2015, the SEC proposed amendments to Reg ATS that would subject ATSs to enhanced reporting requirements on a new mandatory "Form ATS-N" that would be publicly available.[212] We believe that Form ATS-N represents an important step towards improving ATS accountability through enhanced transparency.

Required disclosures on Form ATS-N would include information regarding: (1) products and services offered to subscribers; (2) differences in the availability of services; (3) trading activities by the operator or its affiliates on the venue; (4) arrangements with unaffiliated trading centers; and (5) written standards and procedures associated with access to and protection of confidential customer information.[213] Form ATS-N would also contain detailed information about the ATS's manner of operations, including types of orders, subscriber types, fees, market data, opening and closing, outbound routing, and display and segmentation of order flow.[214] Importantly, disclosures on Form ATS-N would be publicly available, via both the SEC website and a link posted to the ATS's website.[215]

We generally support Form ATS-N and believe that these enhanced public disclosures would facilitate efforts to hold the broker-dealer operators of ATSs accountable for improper trading and disclosure practices. However, we support certain clarifications to the proposed Form ATS-N to make the disclosures as helpful as possible. Specifically, the final Form ATS-N should request information that is in a consistent format wherever possible. We also believe that Form ATS-N responses should be standardized across ATSs to make them as accessible for

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Release No. 77002, File No. 3-17078 6 (Jan. 31, 2016), *available at* https://www.sec.gov/litigation/admin/2016/33-10013.pdf.

[212] *See* Regulation of NMS Stock Alternative Trading Systems, Exchange Act Release No. 76474, File No. S7-23-15 (Nov. 18, 2015), *available at* https://www.sec.gov/rules/proposed/2015/34-76474.pdf.

[213] *Id.* at 152-53.

[214] *See id.*

[215] *See id.*

regulators and investors as possible. These changes would improve the Form's usefulness to investors as a resource for objective comparisons of trading venues.

To standardize Form ATS-N reports, we recommend certain revisions to Parts III and IV of the proposed Form. Parts III and IV contain itemized requests for information regarding the ATS broker-dealer operator's other activities and the manner of operation of the ATS, respectively.[216] Responses to these items would often require narrative disclosures that are attached as exhibits to the filing. For example, Item 10 of Part III requests a description of safeguards and procedures relating to the confidential treatment of trading information.[217] Responses to Part IV are likely to be difficult to compare across venues, although Part IV's stated purpose is to allow market participants to compare and evaluate ATSs vis-à-vis other trading venues.[218] Part IV requests descriptions of 16 separate elements of the ATS's operations. Unless an item is not applicable, each will require a narrative response that addresses certain enumerated points. Rather than requesting specific details via a narrative description, we would encourage the SEC to request information in a yes-no or multiple choice format, wherever possible. Similarly, we would ask that the Form ATS-N and disclosures thereunder use plain language when practicable, to maximize their helpfulness to investors and regulators.

Specific Recommendation:

3. The SEC should require that disclosures on new Form ATS-N are published in a standardized format.

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[216] *See id.*
[217] *See id.*
[218] *See id.*

2) Enhancing the Exchange Regulatory Structure: SRO Status and Legal Immunity

a) *Exchanges as Self-Regulatory Organizations (**"SROs"**)*

Exchanges and "national securities associations" are among the entities designated as "self-regulatory organizations" or "SROs" under the Exchange Act.[219] The only national securities association is FINRA,[220] which is an independent organization that acts as a regulator for the securities industry. The organization was formed in 2007, when the National Association of Securities Dealers (**"NASD"**) was combined with the regulatory arm of the NYSE.[221] FINRA makes and enforces rules for 3,917 securities firms and 639,680 brokers as of July 2016.[222] FINRA also performs a wide range of regulatory tasks: for example, it writes rules that apply to its members (including best execution standards), handles the examination and licensing of broker-dealers, offers investor education services, provides a dispute resolution forum for securities industry matters, and institutes disciplinary actions against members that violate its rules.[223]

As self-regulatory entities, registered exchanges are required to carry out the purposes of the Exchange Act and enforce compliance with exchange rules and the Act itself.[224] Exchanges must also use a "fair procedure" to discipline their members for violating either the exchange rules or the Exchange Act. They can

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[219] 15 U.S.C. § 78(c)(a)(26) (2012). The other two SRO entities are registered clearing agencies and, in limited circumstances, the Municipal Securities Rulemaking Board.
[220] *See, e.g.*, SEC Division of Trading and Markets, Jumpstart Our Business Startups Act Frequently Asked Questions About Crowdfunding Intermediaries, U.S. SEC. & EXCH. COMM'N (May 7, 2012), *available at* https://www.sec.gov/divisions/marketreg/tmjobsact-crowdfundingintermediariesfaq.htm.
[221] *See* Memorandum from SEC Division of Trading and Markets to SEC Market Structure Advisory Committee, Current Regulatory Model for Trading Venues and for Market Data Dissemination, U.S. SEC. & EXCH. COMM'N 12 (Oct. 20, 2015), *available at* https://www.sec.gov/spotlight/emsac/memo-regulatory-model-for-trading-venues.pdf.
[222] *See, e.g.*, *About FINRA*, FINRA, *available at* http://www.finra.org/about.
[223] FINRA Rulemaking Process, FINRA, *available at* http://www.finra.org/industry/finra-rulemaking-process; FINRA Rule 5310 (amended 2014), *available at* http://finra.complinet.com/en/display/display_main.html?rbid=2403&element_id=10455. *What We Do*, FINRA, *available at* http://www.finra.org/about/what-we-do.
[224] 15 U.S.C. § 78f(b)(1) (2010).

discipline their members "by expulsion, suspension, limitation of activities, functions, and operations, fine, censure, being suspended or barred from being associated with a member, or any other fitting sanction." [225] Disciplinary proceedings have certain basic due process requirements, including notice, an opportunity to be heard, and a supporting statement accompanying any penalty.[226]

However, the Exchange Act does not contemplate exchanges conducting their regulatory operations entirely independently. As discussed above, exchange rules are subject to the review and approval of the SEC, and punishments resulting from their disciplinary hearings are also subject to SEC review.[227] The SEC may also suspend, bar or otherwise censure an SRO for failing to enforce compliance with the Exchange Act or its own rules by its members or a person associated with a member (as well as for being unable or unwilling to comply with these rules itself).[228]

In addition, the SEC may allocate regulatory responsibilities among SROs that would otherwise share such regulatory authority.[229] Section 17(d) of the Exchange Act authorizes the SEC to, "by rule or order": (1) relieve an SRO of certain regulatory responsibilities with respect to a member or participant of more than one SRO; and (2) allocate among SROs the authority to adopt rules with respect to matters for which the SROs would otherwise share authority.[230] Under this provision, the SEC promulgated Rule 17d-2 to provide a process for the re-allocation of SRO responsibilities: SROs file a "17d-2" plan with the SEC that sets forth the proposed regulatory re-allocation for SEC review, including a notice and comment period.[231] The SEC may allocate SRO responsibilities as it deems necessary or appropriate in the discharge of its Exchange Act duties, but must take

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[225] 15 U.S.C. §§ 78f(b)(6) and (7) (2010).
[226] 15 U.S.C. §§ 78f(d)(1) and (2) (2010). Section 78(d)(3) provides for summary proceedings, but anyone aggrieved by such an action is entitled to a hearing in accordance with the provisions of 78(d)(1) and (2).
[227] 15 U.S.C. §§ 78s(b) and (d)-(f) (2010).
[228] 15 U.S.C. § 78s(h)(1) (2010).
[229] 15 U.S.C. § 78(q)(d) (2010); 17 C.F.R. § 240.17d-2 (1976).
[230] 15 U.S.C. § 78(q)(d) (2010); 17 C.F.R. § 240.17d-2 (1976).
[231] 17 C.F.R. § 240.17d-2 (1976).

into consideration factors such as the SROs' location, staff, regulatory capabilities, and "unnecessary regulatory duplication."[232]

SROs have also voluntarily entered into Regulatory Services Agreements (**"RSAs"**) with other SROs to contract out *non-common* regulatory responsibilities.[233] The upshot of this ability to outsource SRO obligations is that FINRA now handles many of exchanges' self-regulatory responsibilities on their behalf.[234] For example, under the current RSA between NASDAQ and FINRA, FINRA is responsible for a range of NASDAQ's regulatory duties. These duties include reviewing and approving applications for new members of the exchange, monitoring and reviewing member compliance, and initiating disciplinary proceedings.[235] However, NASDAQ retains its regulatory responsibilities for certain real-time market monitoring, most rulemaking, and some membership functions that were not delegated to FINRA.[236] Similarly, BATS has entered an RSA with FINRA, pursuant to which FINRA provides cross market

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[232] 15 U.S.C. § 78(q)(d) (2010); 17 C.F.R. § 240.17d-2 (1976).

[233] *See, e.g.*, Self-Regulatory Organizations; EDGX Exchange, Inc.; Notice of Filing and Immediate Effectiveness of Proposed Rule Change to Amend Chapter IX of its Rulebook, Exchange Act Release No. 71445, File No. SR-EDGX-2014-01 2 (Jan. 30, 2014), *available at* https://www.sec.gov/rules/sro/edgx/2014/34-71445.pdf; Self-Regulatory Organizations; New York Stock Exchange LLC; Notice of Filing and Immediate Effectiveness of Proposed Rule Change Amending Rules 9268, 9559, and 9620, Exchange Act Release No. 71986, File No. SR-NYSE-2014-20 2 (Apr. 22, 2014), *available at* https://www.sec.gov/rules/sro/nyse/2014/34-71986.pdf; Program for Allocation of Regulatory Responsibilities Pursuant to Rule 17d-2, Exchange Act Release No. 58350, File No. 4-566 5 (Aug. 13, 2008), *available at* https://www.sec.gov/rules/other/2008/34-58350.pdf. The SEC has considered whether it should limit SROs from contracting with others. *See* Daniel M. Gallagher, U.S. SEC. & EXCH. COMM'N, Remarks at the SRO Outreach Conference (Jan. 12, 2012), *available at* https://www.sec.gov/News/Speech/Detail/Speech/1365171489690#.VI58F0sUybI.

[234] Gallagher, *supra* note 233; Letter from SIFMA to SEC, Self-Regulatory Structure of the Securities Market 4 (Jul. 31, 2013).

[235] Nasdaq, Inc., 2015 Annual Report (10-K), 11 (Feb. 26, 2016), *available at* http://www.sec.gov/Archives/edgar/data/1120193/000112019316000020/ndaq-20151231x10k.htm; The Nasdaq Stock Market, Inc., 2007 Annual Report (10-K), 11-12 (Feb. 25, 2008), *available at* http://www.sec.gov/Archives/edgar/data/1120193/000119312508037364/d10k.htm.

[236] Nasdaq, Inc., 2015 Annual Report (10-K), 11 (Feb. 26, 2016), *available at* http://www.sec.gov/Archives/edgar/data/1120193/000112019316000020/ndaq-20151231x10k.htm.

surveillance.[237] BATS remains responsible for surveillance and enforcement with respect to trading activities or practices involving their own market.[238]

It is worth noting that exchanges have recently acted to reassume certain of their regulatory responsibilities from FINRA. For instance, NYSE recently allowed its RSA with FINRA to expire, effectively taking back its responsibility to monitor and enforce member conduct, including by instituting disciplinary proceedings.[239] However, FINRA continues to perform certain of NYSE's regulatory responsibilities, including cross-market surveillance and investigation, as well as the registration, testing, and examination of NYSE broker-dealers.[240]

b) *Centralizing SRO Authorities*

We believe that the SRO system should be restructured in order to promote the efficient and impartial regulation of trading. Although exchanges already delegate many of their regulatory functions to FINRA, the nature and extent of each exchange's outsourcing practices vary.[241] Such inconsistency can hinder the development of best practices. We therefore recommend that policymakers consider formally transferring certain SRO responsibilities to a centralized authority.

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[237] Press Release, FINRA, BATS Global Markets, FINRA Enter Regulatory Service Agreement (Feb. 6, 2014), *available at* https://www.finra.org/newsroom/2014/bats-global-markets-finra-enter-regulatory-service-agreement.

[238] Bats Global Markets, Inc., Prospectus (424B4), 147 (Apr. 14, 2016), *available at* https://www.sec.gov/Archives/edgar/data/1659228/000104746916012249/a2228288z424b4.htm.

[239] *See* Jeff Kern and Christopher Bosch, *NYSE Returns to the Regulatory Beat*, New York Law Journal (Feb. 8, 2016), *available at* http://www.newyorklawjournal.com/id=1202748819238/NYSE-Returns-to-the-Regulatory-Beat.

[240] *Id. See also* Order Approving and Declaring Effective a Proposed Plan for the Allocation of Regulatory Responsibilities, Exchange Act Release No. 76311, File No. 4-618 (Oct. 29, 2015), *available at* https://www.sec.gov/rules/sro/17d-2/2015/34-76311.pdf.

[241] *See, e.g.*, Memorandum from SEC Division of Trading and Markets to SEC Market Structure Advisory Committee, Current Regulatory Model for Trading Venues and for Market Data Dissemination, U.S. SEC. & EXCH. COMM'N 12 (Oct. 20, 2015), *available at* https://www.sec.gov/spotlight/emsac/memo-regulatory-model-for-trading-venues.pdf.

i. *SRO Functions: Rulemaking, Surveillance, and Enforcement*

In our view, there are three basic SRO functions: (1) rulemaking, (2) surveillance, and (3) enforcement. These terms are not formally defined by statute or regulation, but they most commonly describe: (1) developing and implementing an exchange's required policies and practices; (2) overseeing trading activity and member behavior; and (3) ensuring member compliance with laws and exchange rules.

We generally recommend that exchanges retain their rulemaking authorities, but that their surveillance and enforcement authorities be shifted to a centralized regulator to the extent possible. However, we note that although the three categories should guide the division of tasks, there will be exceptions. For example, the SEC's Equity Market Structure Advisory Committee (**"EMSAC"**) Trading Venues Regulation Subcommittee recently noted that exchanges may be best equipped to perform certain real-time surveillance responsibilities, such as monitoring activities on exchange floors or activities relating to an initial public offering.[242]

ii. *Benefits of Centralization*

In the rulemaking context, we believe that there is value in exchanges and ATSs asserting their authority to issue different rules. The cultivation of different trading rules can promote competition among venues, leading to improvements in their processes and rules over time.[243] In addition, the familiarity of SRO staff with member operations and the technicalities of trading on their venue positions them well to develop related rules.[244] However, for purposes of *surveillance* and

[242] *See* Memorandum from EMSAC Trading Venues Regulation Subcommittee to Equity Market Structure Advisory Committee (EMSAC), Recommendations Relating to Trading Venues Regulation, U.S. SEC. & EXCH. COMM'N (Apr. 19, 2016), *available at* https://www.sec.gov/spotlight/emsac/emsac-trading-venues-subcommittee-recommendations-041916.pdf.
[243] Gallagher, *supra* note 233.
[244] *See, e.g.*, Memorandum from SEC Division of Trading and Markets to SEC Market Structure Advisory Committee, Current Regulatory Model for Trading Venues and for Market Data

enforcement of these rules, the potential benefits of centralizing these responsibilities with a single authority are substantial.

First, trading activity in the equity markets is highly dispersed, so a comprehensive view of trading venues is indispensable for effective enforcement efforts. For example, manipulative or disruptive trading practices generally take place over multiple trading venues (and even across different asset classes). However, if trading surveillance and enforcement is divided among several exchanges, it is more difficult to identify abusive trading. Doing so requires effective collaboration, which can be difficult. Assigning enforcement authority to one entity would also simplify regulation from the perspective of market participants.[245] Oversight of these procedures would naturally be streamlined and simplified as well. We also note that the consolidated audit trail (**"CAT"**) will provide a single comprehensive source of order and trade information that would facilitate the centralization of surveillance and enforcement authorities. The details and implementation of the CAT are described further in Chapter 3.

Historically, the SRO enforcement system complemented and reinforced the ownership structure of exchanges. Exchanges were member-owned, mutual organizations,[246] so self-regulation was consistent with their general governance structures. However, U.S. exchanges demutualized over time, and today exchanges resemble conventional shareholder-owned for-profit companies.[247] In fact, today's three dominant exchange groups (NYSE, NASDAQ and BATS) are publicly-owned companies that are accountable to a broad and diverse ownership base, which is often far removed from day-to-day realities of exchange operations. Despite this structural transformation, exchanges retain the same SRO powers that

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Dissemination, U.S. SEC. & EXCH. COMM'N 7 (Oct. 20, 2015), *available at* https://www.sec.gov/spotlight/emsac/memo-regulatory-model-for-trading-venues.pdf.

[245] Gallagher, *supra* note 233.

[246] Memorandum from SEC Division of Trading and Markets to SEC Market Structure Advisory Committee, Current Regulatory Model for Trading Venues and for Market Data Dissemination, U.S. SEC. & EXCH. COMM'N 10 (Oct. 20, 2015), *available at* https://www.sec.gov/spotlight/emsac/memo-regulatory-model-for-trading-venues.pdf.

[247] *Id.*

they had as mutual organizations. As a result, today's exchanges play the dual role of regulator and for-profit enterprise.

Today, there is often a tension between these two functions. For example, exchanges may face conflicts in executing their SRO duties when they regulate broker-dealers that operate ATSs, because ATSs are their competitors. [248] Commercial pressures may also lead exchanges to *under*enforce in order to cultivate important relationships or appease their members. For instance, they might be reluctant to bring enforcement actions against their broker-dealer customers that are responsible for the most trade executions or otherwise favor select customers based on their profit motive.[249] In the past, the SEC has indeed brought enforcement actions against exchanges that fell short in administering their regulatory responsibilities. For example, in 1999 and again in 2005, the SEC brought actions against the NYSE for failing to detect and stop unlawful proprietary trading on the exchange floor;[250] in 2007, the SEC sued the American Stock Exchange for non-compliance with recordkeeping responsibilities and for not enforcing order-handling rules.[251] Thus, to improve both the efficiency and fairness of exchange regulation, centralizing SRO tasks with a separate regulator represents a compelling option.

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[248] *See id.*

[249] Luis A. Aguilar, Commissioner, U.S. SEC. & EXCH. COMM'N, Public Statement, The Need for Robust SEC Oversight of SROs (May 8, 2013), *available at* https://www.sec.gov/News/PublicStmt/Detail/PublicStmt/1365171515546. *See also* Memorandum from SEC Division of Trading and Markets to SEC Market Structure Advisory Committee, Current Regulatory Model for Trading Venues and for Market Data Dissemination, U.S. SEC. & EXCH. COMM'N 10 (Oct. 20, 2015), *available at* https://www.sec.gov/spotlight/emsac/memo-regulatory-model-for-trading-venues.pdf.

[250] Press Release, U.S. SEC. & EXCH. COMM'N, SEC Charges the New York Stock Exchange with Failing to Police Specialists (Apr. 12, 2005), *available at* https://www.sec.gov/news/press/2005-53.htm.

[251] N.Y. Stock Exch., Exchange Act Release No. 51524, File No. 3-11892 (Apr. 12, 2005), *available at* https://www.sec.gov/litigation/admin/34-51524.pdf.

iii. *The Regulator: Alternative Centralization Models*

The SEC has considered alternative SRO models in the past.[252] In its 1994 "Market 2000 Report," the SEC first addressed the possibility of restructuring SRO responsibilities and considered whether the SEC should assume certain of these functions.[253] In 2004, the SEC again focused on this regulatory model in an SRO Concept Release.[254] They acknowledged that the existing system bred certain inefficiencies and conflicts among participants and considered alternative models.[255] These alternatives included: (a) a universal industry self-regulator model, whereby one industry regulator would handle rulemaking, oversight and enforcement; and (b) direct regulation by the SEC.[256] However, the SEC has not acted on either of these alternative models.[257] We consider each of the SEC alternatives separately and find that FINRA is the entity that is likely best positioned to serve as a centralized SRO regulator.

We believe that centralizing SRO authorities at FINRA is a compelling option for several reasons. First, FINRA presently handles a number of exchange regulatory tasks and regulates the broker-dealer operators of ATSs. Consolidating and standardizing certain regulatory responsibilities for exchanges and ATSs would therefore be both efficient and equalizing. Leveling the playing field among trading venues in this way could improve investor outcomes by enhancing the competitive landscape.

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[252] Memorandum from SEC Division of Trading and Markets to SEC Market Structure Advisory Committee, Current Regulatory Model for Trading Venues and for Market Data Dissemination, U.S. SEC. & EXCH. COMM'N 10 (Oct. 20, 2015), *available at* https://www.sec.gov/spotlight/emsac/memo-regulatory-model-for-trading-venues.pdf, citing to 2004 SRO Concept Release at 71259.

[253] *Id.* at 8, citing Market 2000: An Examination of Current Equity Market Developments (1994), *available at* https://www.sec.gov/divisions/marketreg/market2000.pdf.

[254] *Id.* at 8-9, citing to Exchange Act Release No. 50700 (Nov. 18, 2004), 69 FR 71256 (Dec. 8, 2004).

[255] *Id.*

[256] *Id.*

[257] *Id.*

The regulatory process of formally transferring exchange SRO functions to FINRA would likely be relatively easy. Because FINRA is an SRO, the existing infrastructure for FINRA to perform the relevant functions is in place. Exchanges would simply register with FINRA, as broker-dealers do now.[258] In addition, it is possible that the SEC could use its authority under Section 17(d) of the Exchange Act to centralize SRO responsibilities at FINRA.

However, there are certain difficulties to this approach. Most notably, it is unclear how effective centralizing at FINRA would be to mitigate regulatory conflicts of interest. In particular, FINRA's funding model would need to be re-evaluated. Funding by broker-dealer and exchange members could influence its regulatory priorities, particularly if fees were assessed unequally based on member size or capitalization. It would also be necessary to clearly delineate the respective responsibilities of FINRA and the SEC, as this approach could introduce greater potential for overlap or redundancy.

SRO authorities could alternatively be centralized at the SEC. The most effective way to implement this structure would likely be via direct registration by exchanges and ATSs with the SEC. FINRA could take on a more targeted role in the regulation of broker-dealers. The feasibility of this approach would largely turn on the SEC's access to the necessary funding to perform exchange SRO tasks in-house. Centralizing SRO authorities at the SEC would likely require Congressional action to amend or clarify certain provisions of the Exchange Act.

The SEC's relative distance from the technical elements of trading at exchange markets is one major disadvantage of such a structure. Centralizing SRO responsibilities at the SEC would require a particularly slow and considered approach. However, the adoption of new technologies like the Consolidated Audit Trail increases the likelihood that the SEC could effectively regulate technical elements of trading in the equity markets.

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[258] *See, e.g.*, SRO Structure Release, Exchange Act Release No. 50700 (Nov. 18, 2004), 69 Fed. Reg. 71256, 71280 (Dec. 8, 2004).

We believe that an independent research organization should be retained by the SEC to conduct a technical study on how centralization could be achieved. Competitive private sector alternatives to FINRA and the SEC are also worth evaluating. In principle, we believe that centralizing and standardizing SRO surveillance and enforcement authorities to the extent possible is a worthwhile policy goal and that further research into its logistics is warranted.

Specific Recommendation:

4. The surveillance and enforcement regulatory responsibilities currently assigned to SROs should be centralized to the extent practicable. The reorganization could include centralization at either the SEC or FINRA.

c) *Consequence of Exchange SRO Status: Design of NMS Plans*

One consequence of exchanges' SRO status is that they have disproportionate influence in establishing market-wide rules through "national market system plans" (**"NMS Plans"**). SROs' authority to file NMS Plans originates in the 1975 Amendments to the Exchange Act, which allow the SEC to delegate the development and operation of key elements of market infrastructure to the SROs when they jointly file such plans.[259] Reg NMS defines an NMS Plan as any joint SRO plan in connection with (1) the "planning, development, operation or regulation" of a national market system, sub-system or facility thereof; or (2) the "development and implementation of procedures... designed to achieve compliance by SROs and their members" with Reg NMS.[260]

The Exchange Act and Reg NMS do not expressly restrict the scope or contents of NMS Plans, so they can govern a wide range of important market structure issues and their contents can affect essentially every market participant. Indeed, it is within the SEC's discretion which market-wide rules they choose to implement via an NMS Plan. Recent examples include the consolidated audit trail

[259] *See* 15 U.S.C. § 78k-1(a)(3)(B) (2012).
[260] 17 C.F.R. § 242.600(43) (2006).

(CAT), the tick size pilot program, and the governance of the SIPs, which are the consolidated source of market data.

Rule 608 of Reg NMS describes the process whereby SROs may jointly file NMS Plans and amendments thereto with the SEC. NMS Plans are subject to SEC review and approval, as well as a notice and comment period.[261] In general however, NMS Plans are subject to fewer procedural requirements than SEC rules—for example, unlike SEC rules, NMS Plans do not require a cost-benefit analysis. The process to *amend* an NMS Plan is even simpler than the initial filing process, and amendments can be deemed effective when filed. Not only do SROs implement NMS Plans, but they also administer and operate them.[262]

As SROs, exchanges are the key architects of NMS Plans. Other market participants, including ATSs, broker-dealers and investors, have a much more limited role in their design. We believe that this consequence of exchanges' SRO status is outdated and unfair in today's competitive marketplace. For example, broker-dealers must pay for access to the SIPs to ensure that they are getting the best prices for investors. However, the fees for SIP access are determined through NMS Plans, implemented by exchanges that can profit from these fees. Presently, SIP fees are costing investors close to $400 million a year and how these fees are allocated among the SROs is subject to limited disclosure.[263] The CAT NMS Plan is also illustrative of potential unfairness, as the exchanges have proposed a CAT design that leaves broker-dealers incurring approximately $2 billion in implementation costs and $1.5 billion in ongoing annual costs.[264] Meanwhile, the exchanges' costs are expected to be less than 1/10th of broker-dealers' costs.[265]

We encourage Congress and the SEC to reform the limited role that broker-dealers and investors currently have in shaping NMS Plans. We believe that the

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[261] 17 C.F.R. § 242.608 (2006).
[262] 17 C.F.R. § 242.608 (2006).
[263] J.P. Morgan Securities LLC, U.S. Equity Market Structure Update (May 16, 2016).
[264] Notice of Filing of the National Market System Plan Governing the Consolidated Audit Trail, Exchange Act Release No. 77724, 470 (Apr. 27, 2016), *available at* https://www.sec.gov/rules/sro/nms/2016/34-77724.pdf.
[265] *See id.*

role of NMS Plan Advisory Committees should be enhanced. NMS Plan Advisory Committees are not required by statute and their existence and composition are generally at the discretion of the SROs.[266] However, NMS Plans do typically have an Advisory Committee, on which certain key groups of market participants are represented.[267] Examples of such groups are investors, retail broker-dealers, institutional broker-dealers, data vendors, ATSs, and, in the case of the CAT NMS Plan, an academic and a clearing firm representative.[268]

Advisory Committees have limited and informal rights regarding NMS Plans. They may submit their views on NMS Plan matters, but their views are not binding.[269] Advisory Committees may also be restricted from attending NMS Plan meetings if the SROs determine that a meeting warrants confidentiality.[270] In practice, SROs have broad discretion to exclude the Advisory Committee from meetings and are rarely obligated to formally respond to Advisory Committee positions. We believe that the dynamic between SROs and Advisory Committee members is outdated and unfair. Opening up the design and implementation of NMS Plans to non-SROs could benefit the market in many regards: access fees and market data fees would likely be reduced, the costs of the CAT could be more equitably reallocated, and investment in SIP technology could yield faster and more resilient SIPs.

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[266] One notable exception is Rule 613, requiring the Consolidated Audit Trail NMS Plan to have an Advisory Committee and dictating aspects of its composition.

[267] *See, e.g.*, Joint Self-Regulatory Organization Plan Governing The Collection, Consolidation And Dissemination Of Quotation And Transaction Information For Nasdaq-Listed Securities Traded On Exchanges On An Unlisted Trading Privilege Basis, 9, *available at* http://www.utpplan.com/DOC/Nasdaq-UTP%20Plan%20after%2035th%20Amendment%20-%20Excluding%2021st%20Amendment%20-%20i.e.%20Effective%20Plan%20as%20of%209-151.pdf; Second Restatement Of Plan Submitted To The Securities And Exchange Commission Pursuant To Rule 11aa3-1 Under The Securities Exchange Act Of 1934, 14-15, *available at* https://www.nyse.com/publicdocs/ctaplan/notifications/trader-update/CTA_Plan_Composite_as_of_September_1_2015.pdf.

[268] Notice of Filing of the National Market System Plan Governing the Consolidated Audit Trail, Exchange Act Release No. 77724, 799 (Apr. 27, 2016), *available at* https://www.sec.gov/rules/sro/nms/2016/34-77724.pdf.

[269] *See, e.g.*, *supra* note 267.

[270] *Id.*

We agree generally with the approach recently recommended by the EMSAC Trading Venues Regulation Subcommittee to effect a more equitable NMS Plan process.[271] More specifically, on July 8, 2016, the Trading Venues Subcommittee recommended that the SEC take measures to expand and formalize the role of Advisory Committees, in part by enabling the Advisory Committee to hold their own vote on NMS Plan matters.[272] We agree with the spirit of this recommendation and would go one step further, by amending the Exchange Act to grant a representative from key constituent groups of Advisory Committees a separate formal vote on NMS Plans. This would include representatives of broker-dealers and investors, among others.

Second, greater restrictions should be placed on the use and decision-making capabilities of "Executive Sessions," which lack transparency and are controlled only by SROs. Executive Sessions generally refer to the private meetings held by SROs in developing and executing NMS Plans. To call an Executive Session, the SROs must typically comply with only perfunctory procedural requirements, such as a majority vote among themselves and a determination that a matter requires confidentiality.[273] However, SRO Executive Sessions can be used to make important NMS Plan decisions—for example, data access fees can be set via Executive Session.[274] Accordingly, we would accompany the expansion of

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[271] *See* Memorandum from EMSAC Trading Venues Regulation Subcommittee to Equity Market Structure Advisory Committee (EMSAC), Recommendations Relating to Trading Venues Regulation, U.S. SEC. & EXCH. COMM'N (Apr. 19, 2016), *available at* https://www.sec.gov/spotlight/emsac/emsac-trading-venues-subcommittee-recommendations-041916.pdf; Equity Market Structure Advisory Committee (EMSAC), Recommendations Regarding Enhanced Industry Participation in Certain SRO Regulatory Matters, U.S. SEC. & EXCH. COMM'N (Jun. 10, 2016), *available at* https://www.sec.gov/spotlight/emsac/emsac-trading-venues-regulation-subcommittee-recomendation-61016.pdf; Andrew Ackerman , *SEC Urged to Launch Pilot Program for Curbing Maker-Taker Fee Plans*, WALL ST. J. (Jul. 8, 2016), *available at* http://www.wsj.com/articles/sec-urged-to-launch-pilot-program-for-curbing-maker-taker-fee-plans-1468015388.

[272] Equity Market Structure Advisory Committee (EMSAC), Recommendations Regarding Enhanced Industry Participation in Certain SRO Regulatory Matters, U.S. SEC. & EXCH. COMM'N 2 (Jun. 10, 2016), *available at* https://www.sec.gov/spotlight/emsac/emsac-trading-venues-regulation-subcommittee-recomendation-61016.pdf; Ackerman, *supra* note 271.

[273] *See, e.g.*, *supra* note 267.

[274] *See* Letter from Ira D. Hammerman, General Counsel, SIFMA, to John Ramsay, Acting Director, Division of Trading and Markets, SEC (Mar. 28 Letter, 2013) (objecting to the UTP

Advisory Committees' role in NMS Plans with greater restrictions on the use of Executive Sessions.

Specific Recommendation:

5. The NMS Plan process should be revised so that exchange SROs do not have outsize influence in the rulemaking process. Representatives of exchanges, broker-dealers and investors should be permitted to vote on any NMS Plans.

d) *Consequence of Exchange SRO Status: Legal Immunity*

Another consequence of exchanges' SRO status is that they are immune from certain types of legal liability, whereas ATSs and other market participants do not have similar immunity.

Exchange legal immunity originated from the quasi-judicial adjudicatory and disciplinary authorities incident to exchange SRO status.[275] Absolute legal immunity has been granted to judges to protect the judicial decision-making process for centuries.[276] In the 1970s, the Supreme Court extended legal immunity to government agency officials due to the "functional comparability" between the decisions in a government agency's administrative proceedings and traditional court proceedings.[277] Similar reasoning was later used to grant some types of legal immunity to SROs, to protect them from perpetual lawsuits over decisions from their adjudications.[278]

NMS Plan OC's adoption of a fee increase during an executive session excluding the advisory committee,) *available at* http://www.sec.gov/comments/s7-24-89/s72489-31.pdf; Joint Industry Plan, Exchange Act Release No. 69587, File No. S7-24-89 (May 15, 2013), *available at* https://www.sec.gov/rules/sro/nms/2013/34-69587.pdf.

[275] Rohit A. Nafday, Comment, *From Sense to Nonsense and Back Again: SRO Immunity, Doctrinal Bait-and-Switch, and a Call for Coherence*, 77 U. CHI. L. REV 847, 854 (2010), *available at* https://lawreview.uchicago.edu/sites/lawreview.uchicago.edu/files/uploads/77.2/77-2-SRO%20Immunity-Nafday.pdf.

[276] *Id.* at 855.

[277] *Id.* at 857-858.

[278] *Id.* at 854-855, 859.

SRO legal immunity is generally interpreted to apply only to an exchange's regulatory actions.[279] Nevertheless, exchanges have still attempted to use the broadest legal immunity possible during legal proceedings. For example, NASDAQ tried unsuccessfully to invoke its legal immunity to shield itself from claims stemming from its technological failures during the Facebook IPO.[280] Although the court rejected this argument because the claims did not arise out of NASDAQ's regulatory duties, it is notable that the immunity question remained the subject of litigation and appeals for years after the IPO.[281]

SRO legal immunity was established before exchanges became for-profit entities, and it has perpetuated despite the conflicts associated with their profit motive. The effect is that exchanges have a competitive advantage over other trading venues, because they are not exposed to comparable liability.[282] As detailed above, exchanges currently outsource many of their regulatory functions, further bringing the justification for this immunity into question.

As stated in Recommendation 4, we support a reorganization of the SRO system that would centralize SRO regulatory functions to the extent practicable. One significant consequence of such a structure is that the regulatory responsibilities of exchanges and ATSs would increasingly converge. The more similar the trading venues' regulatory responsibilities become, the less justification exists for a unique legal immunity applied to exchange regulatory action. As a centralized structure is implemented, we invite Congress to revisit the Exchange Act to clarify the nature of "SRO" obligations and status, as well as any legal immunity incident thereto.

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[279] Carmen Germaine, *NASDAQ Can't Shake Immunity Decision in Facebook IPO Suit*, LAW 360 (Nov. 25, 2015), *available at* http://www.law360.com/articles/731829/NASDAQ-can-t-shake-immunity-decision-in-facebook-ipo-suit.

[280] *Id.*

[281] *Id.* More than three years after Facebook's May 2012 IPO, U.S. District Judge Robert W. Sweet denied Nasdaq OMX Group Inc.'s motion to vacate a December 2013 decision that found that the immunity protecting the exchange did not apply.

[282] SIFMA, SEC Comment Letter, Re: Self-Regulatory Structure of the Securities Markets, 9 (Jul. 31, 2013).

Specific Recommendation:

6. Once SRO surveillance and enforcement responsibilities have been centralized to the extent practicable, Congress should revisit the Exchange Act to reconsider exchange legal immunity. Exchange legal immunity should only be available for exchange regulatory functions unique to exchanges that cannot be effectively centralized.

Part II: Undisplayed or "Dark" Trading

Undisplayed or "dark" trading describes trades that are executed without the use of publicly displayed orders.[283] In contrast, a displayed quote is viewable by the public and includes: (1) a stock symbol, (2) whether the order is one to buy or to sell, (3) the number of shares, and (4) the price.[284] A dark trade may therefore be said to lack "pre-trade transparency." It is important to clarify that even trades that are executed in the dark are subject to "post-trade transparency." This is because the NMS Plans governing the SIPs require the exchanges and FINRA to report all trade execution information to the SIPs.[285]

Dark trading has always been a part of equity markets. In manual markets, institutional investors used dark trading to execute large orders with minimal price impact. For example, broker-dealers executed orders in what was referred to as the

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[283] *See, e.g.*, Aguilar, *supra* note 183; Robert Bloomfield et al., *Hidden Liquidity: Some New Light on Dark Trading*, 70 JOURNAL OF FINANCE 2227-74 (Oct. 2015).

[284] *SIFMA Paper on Displayed and Non-Displayed Liquidity*, SEC. INDUS. & FIN. MKT. ASS'N 3 (Aug. 31, 2009).

[285] Joint Self-Regulatory Organization Plan Governing The Collection, Consolidation And Dissemination Of Quotation And Transaction Information For Nasdaq-Listed Securities Traded On Exchanges On An Unlisted Trading Privilege Basis, 14-15, *available at* http://www.utpplan.com/DOC/Nasdaq-UTP%20Plan%20after%2035th%20Amendment%20-%20Excluding%2021st%20Amendment%20-%20i.e.%20Effective%20Plan%20as%20of%209-151.pdf; Second Restatement Of Plan Submitted To The Securities And Exchange Commission Pursuant To Rule 11aa3-1 Under The Securities Exchange Act Of 1934, 39-40, *available at* https://www.nyse.com/publicdocs/ctaplan/notifications/trader-update/CTA_Plan_Composite_as_of_September_1_2015.pdf.

"upstairs market." The upstairs market involved broker-dealers directly contacting other broker-dealers off the trading floor and over the phone, which allowed them to avoid publicly displaying their trading interest.[286] Investors used this pre-automation form of dark trading to minimize price impact and transaction costs—the same considerations that drive much of today's dark trading.

However, the volume of trades that are executed in the dark has increased in recent years. For example, dark ATSs and broker-dealer internalizers executed approximately 29.4% of the trading volume in NASDAQ stocks in 2005; by 2014, this proxy for dark trading volume had increased to 38.6%.[287] Recent changes in the dark trading of NYSE stocks is even more significant. In 2005, the volume of NYSE stocks executed by dark ATSs and broker-dealer internalizers was just 13%.[288] By 2014, this dark NYSE stock volume had increased to 34.6%.[289] Today, approximately 37% of U.S. share volume in equities is executed by ATSs and broker-dealer internalizers.[290]

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[286] *See* Stavros Gadinis, *Market Structure for Institutional Investors; Comparing the U.S. and E.U. Regimes*, 3 VA. L. & BUS. REV. 311, 325-26 (2008), *available at* http://scholarship.law.berkeley.edu/facpubs/948. *See generally* Joel Hasbrouck, et al., *New York Stock Exchange Systems and Trading Procedures* (NYSE Working Paper No. 93-01, 1993), *available at* http://people.stern.nyu.edu/jhasbrou/Research/Working%20Papers/NYSE.PDF; Donald Keim & Ananth Madhavan, *The Upstairs Market for Large-Block Transactions: Analysis and Measurement of Price Effects*, 9 THE REVIEW OF FINANCIAL STUDIES 1 (1996), *available at* http://www.business.unr.edu/faculty/liuc/files/RUC/topic_upstairsmarket/Keim_Madhavan_1996.pdf.

[287] Memorandum from SEC Division of Trading and Markets to SEC Market Structure Advisory Committee, Rule 611 of Regulation NMS, U.S. SEC. & EXCH. COMM'N 11-12 (Apr. 30, 2015), *available at* https://www.sec.gov/spotlight/emsac/memo-rule-611-regulation-nms.pdf.

[288] *Id.*

[289] *Id.*

[290] *See* TABB Group, Equities LiquidityMatrix May 2016, *available at* http://mm.tabbforum.com/liquidity_matrices/187/documents/original_2016-05_Equities_Liquidity_Matrix_May_2016.pdf.

A. Dark Trading Across Trading Venues

As discussed earlier in this chapter, it is widely acknowledged that effectively all trading on ATSs and via broker-dealer internalization occurs in the dark. However, according to some estimates a significant amount (roughly 11-14%) of trading volume on exchanges also occurs in the dark.[291] It is difficult to estimate the exact amount of dark trading that occurs on exchanges with any certainty, because exchanges do not disclose their trading volumes that are executed in the dark. In fact, if 11-14% of trading volume on exchanges is dark, then roughly an additional 8% of U.S. share volume is executed in the dark, bringing the total of dark trading to an estimated 45% of U.S. share volume.[292]

Dark trading occurs on exchanges through the use of non-displayed or "hidden" order types. According to one study, these hidden order types are the most frequently used types of orders on exchanges.[293] The existence and popularity of these order types on exchanges is an important consideration in formulating policy recommendations relating to dark trading. For example, one former SEC Commissioner has recommended that "the [SEC] should...study how the use of non-displayed order types by exchanges may affect the price discovery process."[294]

The significant amount of dark trading that occurs on exchanges is often overlooked in policy discussions surrounding dark trading. Instead, the regulation of dark trading is often conflated with the regulation of ATSs. Concerns related to dark trading should not be directed only at certain venues, as dark trading occurs across the market. To produce regulations that accurately reflect the existing market landscape, we believe it is important to improve the transparency

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[291] *U.S. Equity Market Structure: An Investor Perspective*, BLACKROCK 3 (Apr. 2014), *available at* https://www.blackrock.com/corporate/en-au/literature/whitepaper/viewpoint-us-equity-market-structure-april-2014.pdf; In 2013, the SEC estimated approximately 11%-14% of exchange volume to involve non-displayed orders. *Hidden Volume Ratios, Data Highlight 2013-02*, U.S. SEC. & EXCH. COMM'N (Oct. 9, 2013), *available at* https://www.sec.gov/marketstructure/research/highlight-2013-02.html#.Vzsv0JErLIU.

[292] *See supra* notes 127, 150, 169 and related text.

[293] Phil Mackintosh, *Demystifying Order Types*, KCG 10 (Sept. 2014), *available at* https://www.kcg.com/uploads/documents/KCG_Demystifying-Order-Types_092414.pdf.

[294] *See* Aguilar, *supra* note 183.

surrounding the substantial yet largely unacknowledged volume of dark trading that occurs at exchanges. We therefore recommend that the SEC require exchanges to publicly report their undisplayed trading volumes.[295]

Specific Recommendation:

7. Required disclosures of registered exchanges should be revised to include trading volumes attributable to undisplayed ("dark") order flow.

B. Dark Trading and Market Quality

The principal concern with dark trading is that a sufficiently high level of such trading can negatively impact price formation, based on the notion that the fundamental supply and demand for a stock will not be reflected in a stock's publicly displayed price. Inefficiencies in price formation are considered problematic because less informative stock prices can negatively impact efficient capital allocation for investors.

A normative evaluation of the role of dark trading in today's equity markets should be based in empirical findings regarding the relationship between dark trading and market quality. The first part of this section presents empirical data regarding undisplayed liquidity and price improvement. The second part provides a literature review of dark trading and market quality.

1) CCMR Data

Chapter 1 of this report presents the results of empirical analyses regarding the characteristics of today's automated equity markets conducted by the Committee on Capital Markets Regulation (the **"CCMR data"**). In this section, we briefly summarize our findings that relate specifically to the impact of dark trading on market quality.

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[295] Committee member Kenneth Bentsten, Jr. with co-author Curt Bradbury made this recommendation in their New York Times Dealbook article "How to Improve Market Structure" (Jul. 14, 2014) *available at* http://dealbook.nytimes.com/2014/07/14/how-to-improve-market-structure/.

One market quality metric evaluated in the CCMR study is the frequency of price improvement for dark orders, or the percentage of dark orders that are executed at a price better than the best publicly available price (the NBBO). The CCMR data shows that there are dark trades executed on (1) exchanges, (2) ATSs and (3) via broker-dealer internalization that receive price improvement to the NBBO. In addition, the CCMR data shows that both (a) market orders and (b) marketable limit orders that are executed in the dark often receive price improvement.[296]

The percentage of dark orders that receive price improvement varies according to the order type and venue. Figure 1.11 in Chapter 1 (renamed Figure 2.1 below), shows that market orders are more likely to receive price improvement than limit orders.[297] In general, internalized orders and dark orders executed on ATSs are also more likely to receive price improvement than dark orders executed on exchanges.[298] For example, the CCMR data shows that over 80% of market orders that are executed by broker-dealer internalizers receive price improvement and approximately 60% of market orders that are executed on ATSs receive price improvement.[299]

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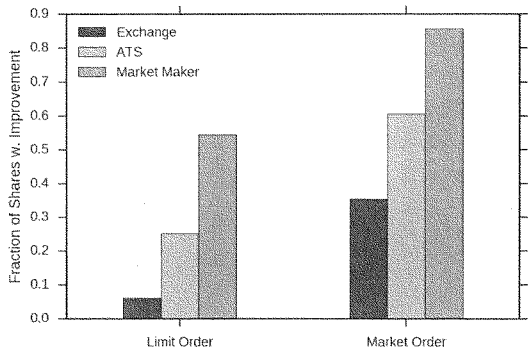
[296] Market orders are orders to execute at the best publicly available price and limit orders are orders to execute at a pre-determined price.
[297] *See supra* Figure 1.11.
[298] *Id.*
[299] *Id.*

Figure 2.1: Frequency of Price Improvement by Venue Type[300]



Another market quality metric analyzed in the CCMR study is the magnitude of price improvement obtained for dark orders. Figure 1.12 in Chapter 1 (renamed Figure 2.2 below), shows that there is measurable average per share price improvement for dark orders across venues and order types.[301] For example, the CCMR data shows that the average per share price improvement provided to limit and market orders on exchanges and ATSs is at least 0.8 cents when executed in the dark.[302] Our data also shows that dark market orders that are executed by broker-dealer internalizers receive an average price improvement of over 0.7 cents per share.[303]

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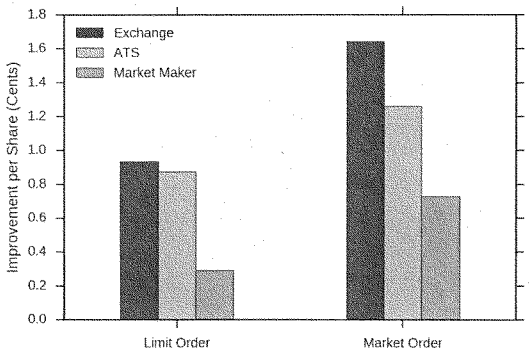
[300] Source: Rule 605 filings for March, April, and May 2016. Market maker data gathered for top 9 venues for non-ATS OTC transactions in Reg NMS stocks (Citadel Securities LLC, KCG Americas LLC, G1 Execution Services LLC, Goldman Sachs & Co, UBS Securities LLC, Two Sigma Securities LLC, Deutsche Bank Securities, Morgan Stanley & Co LLC, and Citigroup Global Markets Inc.). ATS data gathered for 5 of the top 10 ATSs for transactions in Reg NMS stocks (UBS ATS, IEX, JPM-X, Level ATS, and Barclays LX ATS).
[301] *See supra* Figure 1.12.
[302] *Id.*
[303] *Id.*

Figure 2.2: Magnitude of Price Improvement by Venue Type[304]



2) Literature Review regarding Dark Trading and Market Quality

There is a substantial body of literature that finds that dark trading can enhance market quality. For example, in an analysis of dark ATSs, Buti, Rindi and Werner (2011) conclude that such trading improves important measures of market quality, including a narrowing of spreads, increase in market depth, and reduction of short-term volatility.[305] Focusing on liquidity, Hendershott, Jones and Menkveld (2011) show that dark trading helps to provide liquidity to the market.[306] In a theoretical paper on dark trading, Zhu (2014) also finds that dark trading has a

[304] Source: Rule 605 filings for March, April, and May 2016. Market maker data gathered for top 9 venues for non-ATS OTC transactions in Reg NMS stocks (Citadel Securities LLC, KCG Americas LLC, G1 Execution Services LLC, Goldman Sachs & Co, UBS Securities LLC, Two Sigma Securities LLC, Deutsche Bank Securities, Morgan Stanley & Co LLC, and Citigroup Global Markets Inc.). ATS data gathered for 5 of the top 10 ATSs for transactions in Reg NMS stocks (UBS ATS, IEX, JPM-X, Level ATS, and Barclays LX ATS).

[305] *See* Sabrina Buti et al., *Diving into Dark Pools* (Charles A. Dice Center Working Paper 2010-10, 2011), *available at* http://www.erim.eur.nl/fileadmin/erim_content/documents/Werner_April3.pdf.

[306] *See* Terence Hendershott et al., *Does Algorithmic Trading Improve Liquidity?*, 66 THE JOURNAL OF FINANCE 1 (2011).

positive effect on liquidity.[307] Boni, Brown, and Leach (2013) find that dark ATSs designed specifically for buy-side traders exhibit increased execution quality for block trades, suggesting a positive effect for institutional traders.[308]

However, not all academic literature paints a positive picture. Hatheway, Kwan & Zheng (2013) find that nearly half of trades executed in the dark are executed without price improvement over the NBBO.[309] However, their findings have important limitations. First, the authors use off-exchange trading volumes to estimate dark volumes, so their sample is both over- and under-inclusive.[310] This approach contrasts markedly with the approach in the CCMR study, which includes dark trading on exchanges. A second limitation of the Hatheway et al. findings is that dark orders may receive quantifiable cost savings that are not reflected as price improvement to the NBBO.[311] Indeed, a more useful measure of price improvement would be a comparison to the price that would have been obtained if the order had been executed in the lit markets. This is relevant because institutional investors may benefit from reduced price impact from dark trading.

The academic literature to date has provided mixed results regarding the relationship between dark trading and price discovery (the determination of a stock's fundamental price based on its supply, demand, and other market factors). Two theoretical papers that model the impact of dark trading on price discovery reach conflicting conclusions. Ye (2012) predicts that increased dark trading harms

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[307] *See* Haoxiang Zhu, *Do Dark Pools Harm Price Discovery?*, 27 REVIEW OF FINANCIAL STUDIES 747 (2014).
[308] *See* Boni, Brown and Leach, *Dark Pool Exclusivity Matters*, Working Paper (2013).
[309] *See* Frank Hatheway et al., *An Empirical Analysis of Market Segmentation on U.S. Equities Markets* (Working Paper, 2013), *available at* https://www.rhsmith.umd.edu/files/Documents/Centers/CFP/research/hatheway_kwan_zheng.pdf.
[310] *Id.* The sample is over-inclusive because off-exchange trading volumes include lit or partially lit transactions. The sample is under-inclusive because a significant volume of dark trades occurs *on* exchanges.
[311] *Id.* For example, dark trading can minimize the price impact of a large order. In this case, the NBBO *itself* is more favorable due to dark trading, but this quantifiable benefit is not reflected as a rate of improvement to a set NBBO.

price discovery,[312] while Zhu (2014) comes to the opposite conclusion.[313] Zhu (2014) finds that the addition of dark pool trading introduces an element of self-selection among traders, whereby relatively more informed traders transact on lit exchanges and uninformed traders benefit from price improvement provided by dark ATSs or broker-dealer internalizers. The net effect is an overall improvement in price discovery, benefitting the entire market. The theoretical work of Boulatov and George (2013) corroborates the Zhu (2014) results by finding that the provision of liquidity in dark ATSs or by broker-dealer internalizers leads to more competition among informed traders, thereby improving price discovery.[314] However, while Zhu (2014) and Boulatov and George (2013) provide theoretical support that such dark activity improves price discovery, the studies lack empirical backing.

Comerton-Forde and Putnins (2015) filled the empirical void by conducting an empirical study of the effects of dark trading on price discovery.[315] The study confirms the prediction of Zhu (2014) that self-selection occurs in the dark and lit markets by informed and uninformed traders. Overall, the authors find that dark pool activity has a positive impact on price discovery and that "[f]or a typical stock, the level of dark trading is below harmful levels."[316]

Other studies have also considered the effect of varying levels of dark trading on market quality. Some have found that the current level of dark trading is below its optimal level.[317] In other words, more dark trading would be beneficial

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[312] *See* Mao Ye, *Price Manipulation, Price Discovery and Transaction Costs in the Crossing Network* (Working Paper, 2012), *available at* http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2024057.
[313] *See* Zhu, *supra* note 307.
[314] *See* Alex Boulatov & Thomas J. George, Hidden and Displayed Liquidity in Securities Markets with Informed Liquidity Providers, 26 THE REVIEW OF FINANCIAL STUDIES 2095 (2013).
[315] *See* Carole Comerton-Forde & Talis J. Putnins, *Dark Trading and Price Discovery*, 118 JOURNAL OF FINANCIAL ECONOMICS 70 (2015).
[316] *Id.*
[317] Rhodri Preece, *Dark Pools, Internalization, and Equity Market Quality*, CFA INST. (Oct. 2012) (finding that quoted spreads decline as dark pool share approaches 63.9%, but increase from there); Maureen O'Hara & Mao Ye, *Is Market Fragmentation Harming Market Quality?*, 100 JOURNAL OF FINANCIAL ECONOMICS 459 (June 2011) (finding that higher levels of dark execution improve effective spreads).

for market quality. However, others have found that dark trading is harming price efficiency and measures of market quality like effective spread.[318] One study estimated the tipping point at which dark trading begins to potentially harm market quality is 46.7% for all stocks.[319] Up until that threshold, increased dark pool trading leads to narrower spreads and increased depth for best prices. However, after the threshold tipping point is crossed, dark trading becomes harmful. The study also attempted to track the variation in these market quality effects across stocks of different market capitalizations and at broker-dealer internalizers or ATSs. They generally found the threshold tipping point to be higher at ATSs than at internalizers across all ranges of market capitalization. In addition, they found that as market cap increases, the threshold tipping point decreases. For example, if the threshold tipping point were 50% for stocks with a $1 billion market cap, then the tipping point would be lower, say 35%, for stocks with a $5 billion market cap.[320]

We conclude this section by reminding policy makers to review our empirical findings in the course of considering the future regulation of dark trading. We offer no specific policy recommendations stemming from our empirical research and literature review at this time, as in our view the literature is inconclusive in informing appropriate next steps.

C. Trade-At Rule

The "trade-at" rule is a potential reform that would encourage the public display of orders. A trade-at rule would prohibit a trading venue from executing a trade at the NBBO if that trading venue had not been publicly displaying a quote at the NBBO when the order was received. This means that an ATS or broker-dealer internalizer could *not* execute a trade in the dark if it simply matched the best publicly displayed price for a stock. Such trading venues could either (1) execute

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[318] Hatheway et al., *supra* note 309 (finding that price efficiency, as measured by variance ratio, declines as the level of dark execution increases).
[319] Preece, *supra* note 317, at 5-59.
[320] *Id.*

the order with "significant" price improvement to the NBBO or (2) route the order to a venue that was displaying the NBBO.[321]

1) Concerns with a Trade-At Rule

One direct consequence of a trade-at prohibition would be the discouragement of dark trading. It is important to note that this is not necessarily a good thing, as reducing dark trading volume could stymie market quality improvements attributable to undisplayed liquidity. As stated above, certain empirical studies suggest that dark trading has positive effects on market quality, e.g., by finding that dark trading promotes price discovery and liquidity. A rule that would artificially redirect order flow away from dark venues could undermine these market quality improvements.

A trade-at prohibition could also directly increase investor transaction costs. For example, it is generally understood that a trade-at rule would require ATSs or broker-dealer internalizers to achieve a pre-determined minimum amount of price improvement to the NBBO in order to execute a stock. However, this presents the obvious risk that this pre-determined minimum would be set too high (e.g. half a penny) and that, as a result, investors would miss out on slightly better prices that might seem trivial individually but could be very significant in the aggregate and over time.

In addition, dark trading at the NBBO (i.e., not at a price improvement) can reduce the price impact of large institutional orders, which also reduces transactions costs for investors. A trade-at rule could make it harder for institutional investors to minimize price impact. This is true even if the SEC were to include a carve-out for large institutional block orders from the trade-at rule. This is because these large orders are often broken up into many small orders prior to being routed across markets and it is possible that the trade-at rule would fail to properly account for this routing strategy.

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[321] Concept Release on Equity Market Structure, Exchange Act Release No. 61358, File No. S7-12-98 70-71 (Jan. 14, 2010), *available at* https://www.sec.gov/rules/concept/2010/34-61358.pdf.

Canada and Australia recently implemented "trade-at" rules, and in both cases bid-ask spreads increased and the dollar amount of offers to buy and sell at the NBBO decreased. In Canada, overall trading volume declined 20%, investors did not display more liquidity on exchanges, and quoted and effective spreads increased.[322] The Canadian pilot has also produced support for the notion that a trade-at rule interferes with retail investors' price improvement. In Canada, retail investors' average price improvement dropped 70% after the rule was enacted.[323] In Australia, quoted and effective spreads increased as well, with quoted spreads widening by almost 20%.[324]

Market participants and commentators have raised concerns with a potential trade-at prohibition. For example, BATS has warned that a trade-at rule could lead to "potentially wider spreads as well as fewer and inferior execution choices resulting from restrictions on competition."[325] Market structure expert Larry Tabb has predicted that a trade-at prohibition would "force market center consolidation," to the benefit of large exchanges.[326]

Tabb's prediction seems plausible for several reasons. First, a trade-at prohibition would severely restrict the circumstances under which dark executions would be permissible. As a result, dark ATSs would lose order flow and potentially go out of business. These dark venues' current order flow would likely be redirected to exchanges, where the vast majority of displayed executions occur. In addition, as Tabb explains, the current system of broker-dealer internalization of

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[322] Sviatoslav Rosov, *What Early Results on Australian and Canadian Trade-at Rules Mean for Regulation,* CFA INST. (Jan. 7, 2015), *available at* http://blogs.cfainstitute.org/marketintegrity/2015/01/07/what-early-results-on-australian-and-canadian-trade-at-rules-mean-for-regulation/.

[323] Sherree DeCovny, *Rulers of Darkness*, CFA INST. MAGAZINE (Jan./Feb. 2015), *available at* http://www.cfapubs.org/doi/pdf/10.2469/cfm.v26.n1.10.

[324] Rosov, *supra* note 322.

[325] Joe Ratterman & Chris Concannon, Open Letter to U.S. Securities Industry Participants, Re: Market Structure Reform Discussion, BATS TRADING 3 (Jan. 6, 2015), *available at* http://cdn.batstrading.com/resources/newsletters/OpenLetter010615.pdf.

[326] Larry Tabb, *The Grand Bargain: A Great Start, But Don't Hold Your Breath*, TABB GROUP (Jan. 6, 2015), *available at* http://tabbforum.com/opinions/the-grand-bargain-a-great-start-but-don't-hold-your-breath.

retail orders does not always provide mid-point price improvement, which could be mandatory under a trade-at rule.[327] Because a trade-at rule would weaken the competitive position of both ATSs and broker-dealer internalizers relative to exchanges, it would likely mitigate the ability of ATSs and broker-dealer internalizers to continue to provide investors with the benefits described throughout Chapter 1 and Chapter 2.

2) Alternatives to a Trade-At Rule

A broad trade-at prohibition is unlikely to be the most efficient approach to encourage the public display of orders. We believe that the factors that drive dark trading are varied, nuanced, and generally legitimate. For example, as stated earlier, dark trading in order to minimize the price impact of large orders can improve institutional investor outcomes. Additionally, broker-dealer internalization that leads to significant price improvement for retail orders in the aggregate is a beneficial use of dark trading as well (even if the price improvement for those trades is very small for each individual trade).

Market participants may also choose to execute trades in the dark in order to avoid certain costs associated with publicly displaying orders. For example, participants may trade in the dark to avoid exchange access fees. As described in Chapter 3, a liquidity-demanding investor is often required to pay 30¢ per 100 shares to execute against standing limit orders on an exchange. ATS fees can be substantially lower and broker-dealer internalizers generally do not charge fees, increasing incentives to execute in the dark on these venues. Several prominent market participants have identified this possibility.[328]

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[327] *Id.*

[328] SIFMA, SEC Comment Letter, Re: Recommendations for Equity Market Structure Reforms 2-4 (Oct. 24, 2014), *available at* https://www.sec.gov/comments/s7-02-10/s70210-422.pdf; Citigroup Global Markets Inc., SEC Comment Letter, Re: Concept Release on Equity Market Structure (Release No. 34-61358; File No. S7-02-10) 5-7 (Aug. 7, 2014), *available at* https://www.sec.gov/comments/s7-02-10/s70210-416.pdf; BlackRock, SEC Comment Letter, RE: Equity Market Structure Recommendations; Concept Release on Equity Market Structure, File No. S7-02-10; Regulation Systems Compliance and Integrity, File No. S7-01-13; and Equity Market Structure Review 2 (Sept. 12, 2014), *available at* http://www.sec.gov/comments/s7-02-10/s70210-419.pdf.

Instead of implementing a trade-at rule that could increase transaction costs, we recommend reforming certain regulations that may be increasing the cost of publicly displaying orders. We believe that such an approach is less likely than a trade-at prohibition to have an adverse effect on competition. In addition, this approach would not interfere with broker-dealer and investor discretion. Chapter 3 includes proposed reforms to existing regulations that are designed in part to reduce the transaction costs associated with the public display of orders. This includes pilot programs to reduce exchange access fees and lower the minimum pricing increment for the most liquid stocks.

Specific Recommendation:

8. The SEC should *not* implement a trade-at rule, as it could increase investor transaction costs without appreciably improving market quality.

CHAPTER 3: REGULATION NATIONAL MARKET SYSTEM

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CHAPTER 3: REGULATION NATIONAL MARKET SYSTEM

This Chapter is divided into four parts--the order protection rule, access rule, sub-penny rule and market data rules. Each part explains the policy goals underlying each rule and sets forth specific recommendations for how to better achieve those policy goals.

Part I: The Order Protection Rule

Two of the five objectives of the national market system—(1) fostering competition among trading venues and (2) promoting order interaction[329]—can often be at odds with one another. The difficulty is that if orders on one trading venue are not exposed to orders on another trading venue, then investors may not receive the best prices for their orders.

Rules designed to address this conflict are a key feature of the national market system. First, the duty of best execution seeks to ensure that broker-dealers obtain the best terms for customer orders.[330] Prior to Reg NMS, orders for exchange-listed stocks were also subject to the Intermarket Trading System Plan[331] (**"ITS Plan"**), which also sought to ensure that investors would get the best prices for their orders. Reg NMS eliminated the outdated ITS Plan and replaced it with the order protection rule. All three are described below.

A. The Duty of Best Execution

The duty of best execution requires broker-dealers to seek to execute customer trades at the most favorable terms reasonably available under the circumstances. It derives from common law agency principles and fiduciary

[329] *See* 15 U.S.C. § 78k–1(a)(1)(C) (2012).
[330] *See, e.g.*, NORMAN POSER, BROKER-DEALER LAW & REGULATION, § 2.03(B), at 2-58 (3d ed. 2001).
[331] Plan for the Purpose of Creating and Operating an Intermarket Communications Linkage Pursuant to Section 11A(c)(3)(B) of the Securities Exchange Act of 1934, Exchange Act Release No. 14661 (Apr. 14, 1978), 43 Fed. Reg. 17,419 (Apr. 24, 1978).

obligations.[332] Although the duty of best execution predates the federal securities laws, it has been incorporated into the antifraud provisions of federal securities laws through judicial decisions.[333]

FINRA has codified the duty of best execution in its rulebook in FINRA Rule 5310 and enforces it. Rule 5310 identifies five factors that must be considered in carrying out the duty of best execution, in addition to price. These are: (1) the character of the market for the security; (2) the size and type of transaction; (3) the number of markets checked; (4) the accessibility of the quotation; and (5) the terms and conditions of the order as communicated to the firm.[334]

In practice, fulfilling the duty of best execution is markedly different for retail orders than for institutional orders. Due to their small size, retail orders can typically be filled immediately at prices better than or equal to the NBBO.[335] In contrast, due to the size of institutional orders, broker-dealers will often use complex order routing and execution strategies to minimize the price impact of the order. A broker-dealer executing an institutional order must therefore consider numerous factors in addition to the NBBO in carrying out the duty of best execution. In particular, a broker-dealer executing an institutional order is likely to consider the order size, trading venue, and timing for execution that would best minimize the price impact of the order.

The duty of best execution includes several affirmative obligations. For example, broker-dealers must periodically assess the quality of competing markets to ensure that order flow is directed to the markets providing the most beneficial terms for their customer orders.[336] Broker-dealers must also regularly examine their

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[332] FINRA, Regulatory Notice No. 15-46, Best Execution 6 (Nov. 2015), *available at* http://www.finra.org/sites/default/files/notice_doc_file_ref/Notice_Regulatory_15-46.pdf.
[333] *See, e.g.*, Newton v. Merrill, Lynch, Pierce, Fenner & Smith, 135 F.3d 266, 270 (3d Cir. 1998).
[334] FINRA Rule 5310 (amended 2014), *available at* http://finra.complinet.com/en/display/display_main.html?rbid=2403&element_id=10455.
[335] *See* Reproposing Release, Exchange Act Release No. 50870 (Dec. 16, 2004), 69 Fed. Reg. 77424, 77447 (Dec. 27, 2004).
[336] Order Execution Obligations, 61 Fed. Reg. 48290, 48323.

best execution procedures in light of market and technology changes, and modify those practices if necessary to provide their customers with the best reasonably available terms.[337] In doing so, broker-dealers must take into account price improvement opportunities, and whether different markets may be more suitable for different types of orders or particular securities.[338]

Despite this guidance, the best execution requirement cannot practically ensure that a customer will receive the best terms for their order in every instance; it requires only that a broker-dealer seek to do so in a reasonable manner and then sets forth specific obligations that are intended to assist with this goal.

B. The ITS Plan

The ITS Plan, designed in the 1970s, required orders for exchange-listed stocks to be executed at the trading venue displaying the best price.[339] The ITS Plan was an NMS Plan,[340] so SROs, not the SEC, devised its rules.[341] It is important to note that NASDAQ stocks were not subject to the ITS Plan, because the ITS Plan only applied to exchange-listed stocks and NASDAQ did not register as an exchange until 2006.[342] Before then, NASDAQ operated as an electronic stock market, or "automated inter-dealer quotation system."[343]

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[337] *Id.*
[338] *Id.*
[339] *See* Plan for the Purpose of Creating and Operating an Intermarket Communications Linkage Pursuant to Section 11A(c)(3)(B) of the Securities Exchange Act of 1934, Exchange Act Release No. 14661 (Apr. 14, 1978), 43 Fed. Reg. 17419 (Apr. 24, 1978).
[340] For a detailed discussion of NMS Plans and the problems with implementing market-wide rules using them, *see* Chapter 2.
[341] *Id.*; *see also,* Regulation NMS, Exchange Act Release No. 51808, 70 Fed. Reg. 37496, 37501 (Jun. 29, 2005), *available at* https://www.sec.gov/rules/final/34-51808fr.pdf.
[342] *See, e.g.,* NASDAQ Press Release, Nasdaq Becomes Operational as a National Securities Exchange (Aug. 1, 2006), *available at* http://ir.nasdaq.com/releasedetail.cfm?releaseid=205921; Morrison & Foerster LLP, Impact of Recent NASDAQ Changes on Listed Companies (Jul. 12, 2006), *available at* http://www.mofo.com/resources/publications/2006/07/impact-of-recent-nasdaq-changes-on-listed-compan__.
[343] Morrison & Foerster LLP, *supra* note 342. Before 2006, NASDAQ was an automated inter-dealer quotation system of a national securities association registered under Section 15A of the Exchange Act.

The key shortcoming of the ITS Plan was that it did not distinguish between automated orders and manual orders on an exchange floor.[344] For that reason, broker-dealers were required to check the exchange floor before executing an automated order.[345] This was a time-consuming process and often resulted in trading delays of up to 30 seconds.[346] It also provided floor-based manual markets with a structural trading advantage to automated markets. As a result, in 2005 almost 80% of NYSE stocks still traded manually on the floor of the NYSE.[347] In contrast, NASDAQ stocks had already been trading in a highly automated fashion and across many ATSs since the mid-1990s.[348]

Eventually the SEC learned that requiring broker-dealers to wait for a response from the floor meant that investors could wind up missing both the best price of a manual quotation and prices at automated markets that would have been immediately accessible.[349] Executing an order at a worse price than the best publicly available price is often referred to as a "trade-through".[350] Although the

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[344] *See* Plan for the Purpose of Creating and Operating an Intermarket Communications Linkage Pursuant to Section 11A(c)(3)(B) of the Securities Exchange Act of 1934, Exchange Act Release No. 14661 (Apr. 14, 1978), 43 Fed. Reg. 17419 (Apr. 24, 1978); Regulation NMS, Exchange Act Release No. 51808, 70 Fed. Reg. 37496 (Jun. 29, 2005), *available at* https://www.sec.gov/rules/final/34-51808fr.pdf.

[345] *See* Joel Hasbrouck, et al., *New York Stock Exchange Systems and Trading Procedures* 26-29 (NYSE Working Paper No. 93-01, 1993), *available at* http://people.stern.nyu.edu/jhasbrou/Research/Working%20Papers/NYSE.PDF.

[346] Memorandum from SEC Division of Trading and Markets to SEC Market Structure Advisory Committee, Rule 611 of Regulation NMS, U.S. SEC. & EXCH. COMM'N 7-8 (Apr. 30, 2015), *available at* https://www.sec.gov/spotlight/emsac/memo-rule-611-regulation-nms.pdf. *See also* Plan for the Purpose of Creating and Operating an Intermarket Communications Linkage Pursuant to Section 11A(c)(3)(B) of the Securities Exchange Act of 1934, Exchange Act Release No. 14661 (Apr. 14, 1978), 43 Fed. Reg. 17419 (Apr. 24, 1978).

[347] Concept Release on Equity Market Structure, Exchange Act Release No. 61358, File No. S7-12-98 5 (Jan. 14, 2010), *available at* https://www.sec.gov/rules/concept/2010/34-61358.pdf; *see also* Regulation NMS, Exchange Act Release No. 51808, 70 Fed. Reg. 37496, 37505 n.55 (Jun. 29, 2005).

[348] Concept Release on Equity Market Structure, Exchange Act Release No. 61358, File No. S7-12-98 5 (Jan. 14, 2010), *available at* https://www.sec.gov/rules/concept/2010/34-61358.pdf.

[349] Regulation NMS, Exchange Act Release No. 51808, 70 Fed. Reg. 37496 (Jun. 29, 2005), *available at* https://www.sec.gov/rules/final/34-51808fr.pdf.

[350] *See, generally,* Memorandum from SEC Division of Trading and Markets to SEC Market Structure Advisory Committee, Rule 611 of Regulation NMS, U.S. SEC. AND EXCH. COMM'N 2

ITS Plan stated that markets "should avoid" trade-throughs and provided a post hoc grievance process for those whose order had been traded through,[351] an SEC staff study found that, under the ITS Plan, an estimated 1 in 40 trades for NYSE stocks were executed at prices inferior to the best displayed quotations.[352] The same study also found that the duty of best execution alone was insufficient to ensure that investor orders in NASDAQ stocks obtained the best available prices.[353] Investors in NASDAQ stocks missed the best available price with a similar degree of frequency as investors in NYSE stocks.[354]

The SEC estimated that the *annual cost* to investors of trade-throughs was over $320 million.[355] In response to these findings, the SEC implemented Rule 611 of Reg NMS,[356] the order protection rule, to lower investor transaction costs by reducing the frequency of trade-throughs.[357]

C. The Order Protection Rule

The order protection rule requires "trading centers," including exchanges, ATSs and broker-dealer internalizers,[358] to establish, maintain, and enforce written

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(Apr. 30, 2015), *available at* https://www.sec.gov/spotlight/emsac/memo-rule-611-regulation-nms.pdf.

[351] Regulation NMS, Exchange Act Release No. 51808, 70 Fed. Reg. 37496, 37501 (Jun. 29, 2005), *available at* https://www.sec.gov/rules/final/34-51808fr.pdf.

[352] Regulation NMS, Exchange Act Release No. 51808, 70 Fed. Reg. 37496, 37507 (Jun. 29, 2005), *available at* https://www.sec.gov/rules/final/34-51808fr.pdf. It found that the overall trade-through rates for NASDAQ stocks and NYSE stocks were, respectively, 7.9% and 7.2% of the total volume of traded shares. In addition, the staff study found that the amount of the trade-throughs was significant – 2.3 cents per share on average for NASDAQ stocks and 2.2 cents per share for NYSE stocks.

[353] *See id.* at 37508.

[354] *Id.* at 37507.

[355] *Id.*

[356] 17 C.F.R. § 242.611 (2015).

[357] Regulation NMS, Exchange Act Release No. 51808, 70 Fed. Reg. 37496, 37510 (Jun. 29, 2005), *available at* https://www.sec.gov/rules/final/34-51808fr.pdf.

[358] 17 C.F.R. § 242.600(b)(78) (2005) ("Trading center means a national securities exchange or national securities association that operates an SRO trading facility, an alternative trading system, an exchange market maker, an OTC market maker, or any other broker or dealer that executes orders internally by trading as principal or crossing orders as agent.").

policies and procedures that are reasonably designed to prevent trade-throughs of "protected quotations."[359]

Protected quotations are the best publicly displayed automated quotations on each exchange and the ADF (the display only facility operated by FINRA for the rare occasion when ATSs publicly display quotes).[360] The best protected quotations for a stock across all exchanges and the ADF are often referred to as the "national best bid and offer" (**"NBBO"**). While the order protection rule restricts order execution at a price worse than the NBBO, trading centers are free to execute orders at a price matching the NBBO even if they were not displaying that price.[361]

Importantly, the order protection rule only protects quotes that are *immediately* accessible through automatic execution so automated orders do not have to wait for slower manual markets.[362] However, the SEC did not define "immediate" in absolute terms. Instead, the SEC required that an exchange provide "the fastest response possible without any programmed delay."[363] This requirement relates to a particularly contentious aspect of the recent exchange application filed by IEX, which the SEC approved in June 2016.[364] Some argue that quotes on IEX

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[359] *See* 17 C.F.R. § 242.611 (2005).
[360] Memorandum from SEC Division of Trading and Markets to SEC Market Structure Advisory Committee, Rule 611 of Regulation NMS, U.S. SEC. AND EXCH. COMM'N 3 (Apr. 30, 2015), *available at* https://www.sec.gov/spotlight/emsac/memo-rule-611-regulation-nms.pdf; As discussed in Chapter 2, the ADF is facility run by FINRA that displays quotations and trade reports, but which cannot be used as an execution platform. Quotes displayed on the ATS are included in consolidated market data. ATSs display quotes on the ADF either by choice (which is extremely rare) or when required to do so pursuant to Reg ATS. *See Alternative Display Facility (ADF)*, FINRA, *available at* http://www.finra.org/industry/adf.
[361] *Id.* at 4. This contrasts with the potential "trade-at" prohibition described earlier, which would require that orders are routed for execution against displayed quotations before they could be executed at matching prices.
[362] *See id.* at 3 n.5.
[363] Regulation NMS, Exchange Act Release No. 51808, 70 Fed. Reg. 37496, 37534 (Jun. 29, 2005), *available at* https://www.sec.gov/rules/final/34-51808fr.pdf.
[364] *See* In the Matter of the Application of Investors' Exchange, LLC for Registration as a National Securities Exchange, Exchange Act Release No. 78101, File No. 10-222 (Jun. 17, 2016), *available at* https://www.sec.gov/rules/other/2016/34-78101.pdf.

are not "immediate" and thus should not be protected quotations,[365] because IEX has implemented a programmed 350-microsecond access delay for stock quotes on its venue.[366]

In considering IEX's application, the SEC revisited its guidance on protected quotations, and interpreted "immediate" to permit "a de minimis intentional delay—i.e., a delay so short as to not frustrate the purposes of Rule 611 by impairing fair and efficient access to an exchange's quotations."[367] The SEC found that IEX's programmed delay is "well within geographic and technological latencies experienced today that do not impair fair and efficient access to an exchange's quotations…"[368] Accordingly, the SEC concluded that IEX's delay is de minimis and that IEX can maintain protected quotations.[369] As indicated in our March 2016 letter to the SEC, we believe that such intentional delays should require SEC approval.[370] The SEC adopted this approach in approving IEX.

The order protection rule also includes a "self-help" remedy, which allows trading centers to bypass the quotations of an exchange that is experiencing a failure, material delay, or malfunction of its systems or equipment and does not respond within one second.[371] Without the self-help rule, if an exchange displaying

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[365] *See, e.g.*, N.Y. Stock Exch., SEC Comment Letter, Re: Investors' Exchange LLC Form 1 Application (Release No. 34-75925, File No. 10-222) (Nov. 12, 2015), *available at* http://www.sec.gov/comments/10-222/10222-19.pdf.
[366] *See id.*
[367] Commission Interpretation Regarding Automated Quotations Under Regulation NMS, Exchange Act Release No. 78102, File No. S7-03-16 2-3 (Jun. 17, 2016), *available at* https://www.sec.gov/rules/interp/2016/34-78102.pdf.
[368] In the Matter of the Application of Investors' Exchange, LLC for Registration as a National Securities Exchange, Exchange Act Release No. 78101, File No. 10-222 77 (Jun. 17, 2016), *available at* https://www.sec.gov/rules/other/2016/34-78101.pdf.
[369] *Id.*
[370] *See* Letter from the Committee on Capital Markets Regulation to U.S. Securities and Exchange Commission Re: Notice of Proposed Interpretation Regarding Automated Quotations Under Regulation National Market System, dated as of April 14, 2016, *available at* https://www.sec.gov/comments/s7-03-16/s70316-8.pdf.
[371] *See* 17 C.F.R. § 242.611 (2005).

the NBBO were to malfunction, then the order protection rule could require a trading halt across all markets.[372]

1) Benefits of the Order Protection Rule

According to the SEC, the order protection rule has successfully reduced the frequency with which investors miss the best available prices.[373] In February 2014, the trade-through rates for both NASDAQ and NYSE stocks were approximately 0.1% for number of trades and 0.2% for share volume.[374] These figures reflect a more than 95% decline from pre-NMS trade-through rates,[375] or a decline from $320 million in annual costs from trade-throughs to just $16 million.[376] As described in detail in Chapter 1, liquidity has also increased since the order protection rule was implemented, as measured by lower spreads and more depth at the NBBO.[377]

2) Criticisms of the Order Protection Rule

Some critics have suggested that the order protection rule has contributed to the fragmentation of trading across many trading venues. These critics argue that the order protection rule does so by requiring market participants to route orders to

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[372] *See* NYSE Rule 51(c); NASDAQ Rule 4120(a)(6); CTA Plan, Second Restatement of Plan Submitted to the Securities and Exchange Commission Pursuant to Rule 11Aa3-1 Under the Securities Exchange Act of 1934, 48 (Sept. 1, 2015), *available at* https://www.nyse.com/publicdocs/ctaplan/notifications/trader-update/CTA_Plan_Composite_as_of_September_1_2015.pdf; Joint Self-Regulatory Organization Plan Governing the Collection, Consolidation and Dissemination of Quotation and Transaction Information for NASDAQ-Listed Securities Traded on Exchanges on an Unlisted Trading Privileges Basis 5, *available at* http://www.utpplan.com/DOC/UTP_Plan.pdf.
[373] Memorandum from SEC Division of Trading and Markets to SEC Market Structure Advisory Committee, Rule 611 of Regulation NMS, U.S. SEC. AND EXCH. COMM'N 3 (Apr. 30, 2015) at 13-14, *available at* https://www.sec.gov/spotlight/emsac/memo-rule-611-regulation-nms.pdf.
[374] *Id.*
[375] *See id.*
[376] *See id.*
[377] *See supra* Chapter 1.

certain exchanges that they might otherwise choose to avoid.[378] They also argue that the order protection rule may have done so by making it easier for new exchanges to enter the market and attract order flow.[379] In particular, they suggest that the order protection rule may lower barriers to entry by allowing any exchange to display a protected quotation, regardless of its trading volume.[380] In their view, fragmentation can be bad for investors because it enhances market complexity and therefore the opacity of today's markets.[381] Lastly, they argue that the costs of maintaining connectivity to exchanges with very little trading volume are significant and ultimately borne by investors.[382]

These critics also suggest that the fragmentation of the marketplace has contributed to the prevalence of HFT strategies, because market participants can use HFT strategies to engage in latency arbitrage across multiple trading venues.[383] They argue that these HFT strategies profit at the expense of long-term investors. However, this criticism fails to note that HFT strategies are just as prevalent in markets that have a highly centralized structure. For example, approximately 50% of the trading volume in the highly centralized futures market also comes from HFT strategies.[384]

Furthermore, the contention that the order protection rule has caused market fragmentation is not well supported by the evidence. It is true that trading in NYSE stocks became increasingly fragmented after the introduction of the order protection rule.[385] However, trading in NASDAQ stocks was highly fragmented before it was subject to the order protection rule and fragmentation in trading of

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[378] *See* Memorandum from SEC Division of Trading and Markets to SEC Market Structure Advisory Committee, Rule 611 of Regulation NMS, U.S. SEC. AND EXCH. COMM'N 15 (Apr. 30, 2015), *available at* https://www.sec.gov/spotlight/emsac/memo-rule-611-regulation-nms.pdf.
[379] *Id.* at 16.
[380] *Id.*
[381] *Id.* at 15-17.
[382] *Id.*
[383] *See, e.g.*, Ananth Madhavan, Exchange-Traded Funds, Market Structure and the Flash Crash (BlackRock Working Paper, 2012).
[384] *See id.*
[385] *See supra* Chapter 1.

NASDAQ stocks did not materially increase after the rule was implemented.[386] It is therefore more likely that the significant increase in fragmentation in trading of NYSE stocks has more to do with the elimination of the ITS Plan, which provided the NYSE floor traders with a structural trading advantage, than with the order protection rule encouraging fragmentation itself.

Other critics have suggested that the order protection rule places too heavy an emphasis on speed to the exclusion of other important factors, such as the *size* of a publicly displayed order.[387] An emphasis on speed is indeed evident in the market structure—for example, exchanges currently implement a "price-time" priority, where the order that arrives first gets execution priority over other orders.[388]

However, the order protection rule does *not* require that exchanges prioritize speed over all other considerations. For example, suppose an exchange receives two orders at the NBBO. Order 1 arrives first in time, but Order 2 is much larger. The exchange may implement a system whereby Order 2 receives execution priority over Order 1. Indeed, NASDAQ has implemented such a trading system in the past.[389] Therefore, concerns that the order protection rule has mandated competition by speed are unfounded. It is further notable that exchanges for futures, currencies, foreign stocks and other asset classes also choose to prioritize speed, despite the fact that these markets do not have an order protection rule.[390]

Finally, certain critics of the order protection rule have highlighted potential negative consequences of the rule's strict price requirement. In particular, they argue that the goal of minimizing trading costs can actually be undermined by

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[386] *See* Concept Release on Equity Market Structure, Exchange Act Release No. 61358, 75 Fed. Reg. 3594, 3594 n.5 (proposed Jan. 21, 2010), *available at* https://www.sec.gov/rules/concept/2010/34-61358fr.pdf.
[387] *See, e.g.*, Regulation NMS, Exchange Act Release No. 51808, 70 Fed. Reg. 37496 (Jun. 29, 2005), *available at* https://www.sec.gov/rules/final/34-51808fr.pdf.
[388] Memorandum from SEC Division of Trading and Markets to SEC Market Structure Advisory Committee, Rule 611 of Regulation NMS, U.S. SEC. AND EXCH. COMM'N 17-18 (Apr. 30, 2015), *available at* https://www.sec.gov/spotlight/emsac/memo-rule-611-regulation-nms.pdf.
[389] *See id.* at 18.
[390] *See id.* at 18-19.

requiring execution at prices equal to or better than the NBBO. The theory behind this criticism is that a rule that mandates execution at the NBBO may be forcing investors to trade at exchanges that charge high fees. For example, exchanges charge access fees and market data fees, both of which are described in detail later in this Chapter. The costs of these fees are not reflected in a stock's price. As a result, although the order protection rule requires that investor orders be executed at the exchange with the best publicly displayed price, investors may actually receive a worse effective price once these fees are taken into account. These critics argue that eliminating the order protection rule would allow broker-dealers to avoid exchanges that charge high fees. The obvious counterargument to this position is that, without price protection, trade-through rates could increase and the increased cost associated with trade-throughs would more than offset any potential savings from avoiding exchange fees.

D. Achieving the Goals of the Order Protection Rule

The policy goals of the order protection rule could be better achieved through reforms to Reg NMS in three important respects. First, disclosure from broker-dealers and trading venues regarding execution quality and order routing should be improved. This will enhance competition among broker-dealers and trading venues, which should lower transaction costs for investors. Second, the SEC should implement the consolidated audit trail, so that regulators are better positioned to assess whether investors are receiving the best prices for their orders. Third, odd lot trades should be subject to the order protection rule. This could provide retail investors with better prices for their orders.

1) Broker-dealer and Trading Venue Disclosures

As described throughout this report, broker-dealers have a number of options for where to execute a customer's order. For this reason, and because neither the order protection rule nor the duty of best execution *guarantee* that an order will be executed at the venue with the best effective price, transparency and disclosure are critical to broker-dealer routing strategies.

For example, the order protection rule does not prevent a broker-dealer from routing an order to a trading center offering a quarter-cent of price improvement to

the NBBO instead of to another trading center that would have offered a half-cent of price improvement to the NBBO. While the duty of best execution would require broker-dealers to use best efforts to identify the trading center with the half-cent of price improvement, today's markets are highly complex and often opaque, and so broker-dealers would not always know that another venue could have offered more price improvement to the NBBO. It is therefore critical that the market be as transparent as possible, so broker-dealers can find the venues that would offer the most price improvement for their customers.

The SEC adopted the current disclosure regime for broker-dealers and trading venues in 2000. These requirements were then incorporated into Reg NMS as: (1) Rule 605,[391] which requires trading venues to make disclosures about execution quality; and (2) Rule 606,[392] which requires broker-dealers to make disclosures regarding their order handling practices. Neither Rule 605 nor Rule 606 currently requires routine order-by-order or customer-by-customer disclosures.

Rule 605 requires trading venues to prepare monthly reports that publicly disclose standardized information about the execution quality that they achieve for retail-size customer orders.[393] Rule 606 requires broker-dealers to publicly disclose, on a quarterly basis, the identity of each trading venue to which they

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[391] 17 C.F.R. § 242.605 (2005).
[392] 17 C.F.R. § 242.606 (2005).
[393] 17 C.F.R. § 242.605 (2005). Execution quality reported under Rule 605 is supposed to be measured using the NBBO as disseminated by the SIP feeds. In emphasizing the required use of SIP-based NBBOs, the SEC staff has explained that benchmarking executions across market centers to the same reference points would further the important objective of generating "execution quality statistics that are comparable among different market centers." A "national best bid and offer" or "NBBO" is specifically defined under Regulation NMS as the best bid and offer for an NMS security disseminated by a SIP pursuant to an NMS Plan. 17 C.F.R. § 242.600(b)(42) (2005). In a bulletin addressing FAQs concerning Rule 11Ac1-5 (the rule redesignated as Rule 605 by Regulation NMS), SEC staff emphasized that Rule 11Ac1-5 required the use of SIP-based NBBOs. SEC Division of Market Regulation, Staff Legal Bulletin No. 12R (Revised), *Frequently Asked Questions About Rule 11Ac1-5* Q. 21 (Jun. 22, 2001), *available at* http://www.sec.gov/interps/legal/slbim12a.htm. That bulletin continues to be operative for Rule 605. *See* SEC Division of Market Regulation, *Responses to Frequently Asked Questions Concerning Rule 605 of Regulation NMS* (Feb. 22, 2013), *available at* http://www.sec.gov/divisions/marketreg/nmsfaq605.htm.

route a significant percentage of retail-size customer orders, as well as the nature of their relationship with each trading venue (including any payment for order flow arrangements).[394] Under Rule 606, broker-dealers must also disclose, at the request of a customer, the identities of each trading venue to which the broker routed that particular customer's order during the preceding six-month period.[395] Figure 3.1 below summarizes the requirements of Rule 605 and Rule 606.

As described in Chapter 1, the equity market structure has become much faster and more complex in recent years. Broker-dealers have developed new and innovative order routing and execution strategies, and trading venue fragmentation has increased. However, the SEC's disclosure regime for broker-dealers and trading venues has remained largely unchanged. We believe that the disclosure regime should be modernized by, among other things, requiring retail brokerages to provide disclosure on execution quality for their customers and requiring broker-dealers to provide institutional customers with standardized reports that provide routing and execution quality statistics. We describe our recommended changes to the existing disclosure regime below.

Figure 3.1 Summary of SEC Rules 605 & 606[396]
See next pages.

[394] 17 C.F.R. § 242.606 (2005).
[395] *Id.*
[396] *See* Disclosure of Order Execution and Routing Practices, 65 Fed. Reg. 75413, 75414 (Dec. 1, 2000).

Rule 605	
Entities Required to Submit	Exchanges, ATSs and broker-dealer internalizers.
Disclosure Requirements	• Requires monthly electronic report categorized by individual security, order type, and order size for securities that the trading venue executes. • Orders must be sub-categorized by type of order (including market, marketable limit, inside-the-quote limit, at-the-quote limit, and near-the-quote limit). The four required buckets for order size are 100-499, 500-1999, 2000-4999, and 5000 or more shares. • For each subcategory, 11 columns of information must be provided. First, the number of all orders received. The next four columns show the cumulative number of shares of (i) covered orders, (ii) covered orders canceled prior to execution, (iii) covered orders executed at the receiving market center, and (iv) covered orders executed at any other venue. In calculating these statistics, the time is defined as the time (to the second) an order was received by a market center for execution. The next five columns ask for the number of shares that were executed within specified periods of time after order receipt. The final column required for all types of orders is the average realized spread. The average realized spread is defined as the share-weighted average of realized spreads for executed orders and is calculated as double the difference between the execution price and the midpoint of the consolidated best bid and offer five minutes after the time of order execution. • An additional nine columns of information are required for subcategories of market orders and marketable limit orders. The first of these columns is the average effective spread (in contrast to the average "realized" spread discussed above). The average realized spread differs in timing from the average effective spread. The average realized spread is calculated five minutes after an order was received by a market center for execution while the average effective spread is calculated at the time (to the second) that an order was received for execution. • The final eight columns of information required for market and marketable limit orders divide the major determinants of execution quality that are summarized in the average effective spread. These orders are classified based on whether they were executed with price improvement, executed at the quote, or executed outside the quote.

Rule 606	
Entities Required to Submit	Broker-dealers that route orders on behalf of customers must release quarterly reports detailing their order routing practices. They are not required to do so for each institutional or retail customer.
Disclosure Requirements	• Requires quarterly reports divided into four sections for four different types of covered securities: (1) equity securities listed on the NYSE; (2) equity securities qualified for listing on NASDAQ; (3) equity securities listed on the Amex or any other national securities exchange; and (4) options. • For each of these four sections, requires broker-dealers to give a "quantitative description" of the aggregate nature of their order flow, which must include the percentage of total customer orders for a particular section that were non-directed orders, and the percentages of total non-directed orders for a section that were market orders, limit orders, and other orders. A non-directed order is defined as any order in which the customer did not specifically select a particular venue for execution. • Quantitative description must include the identity of the top ten trading venues used by the broker-dealer for execution. It must also include any venue to which 5% or more of non-directed orders were routed and executed. The broker-dealer must also disclose the percentage of total non-directed orders for the section routed to the venue, and the percentages of total non-directed market orders, non-directed limit orders, and non-directed other orders for the section that were routed to the venue. • A broker-dealer is also required to describe any payment for order flow arrangements.

a) *Disclosure Requirements for Retail Orders*

It is difficult for retail investors to determine the execution quality achieved by their retail brokerages. This is because Rule 605 execution quality statistics and Rule 606 order routing statistics appear in separate reports. We describe this problem with an example.

Suppose Retail Brokerage A routes all customer orders to Broker-dealer Internalizer 1. Retail Brokerage A's Rule 606 disclosures would tell the retail customer the percentage of the broker's total order flow sent to Broker-dealer Internalizer 1 and whether any payment for order flow arrangements exist. If a retail investor wanted to then determine the execution quality that his orders received, he would need to separately review the Rule 605 execution quality statistics of Broker-dealer Internalizer 1. However, Rule 605 does not require Broker-dealer Internalizer 1 to disclose execution quality metrics for *each* retail brokerage that routes orders to it. As a result, if Broker-dealer Internalizer 1 executes orders for multiple retail brokerages (which is very common),[397] then the Rule 605 disclosures would not indicate the execution quality that applies specifically to the orders received from Retail Brokerage A. Therefore, under the current disclosure regime, it is difficult for a retail investor to determine the execution quality that his retail brokerage obtains for his orders.

To address this concern, we believe that each retail brokerage should produce a report that allows retail investors to determine the execution quality of their orders. This would require combining the retail brokerage's order routing statistics with the relevant measures of execution quality received at each venue to which the retail brokerage routes orders. It is important to note that, although the SEC recently proposed rule changes that would enhance retail order disclosures,

[397] Memorandum from SEC Division of Trading and Markets to SEC Equity Market Structure Advisory Committee, Certain Issues Affecting Customers in the Current Equity Market Structure, U.S. SEC. & EXCH. COMM'N 6 (Jan. 26, 2016), *available at* https://www.sec.gov/spotlight/equity-market-structure/issues-affecting-customers-emsac-012616.pdf.

their proposal would not include this requirement.[398] However, we believe that combining the reports in this manner is an important measure to provide retail investors with the information that they need to evaluate broker performance and the impact of payment for order flow arrangements. Such disclosures would likely enhance competition among retail brokerages over execution quality and even brokerage commissions. In addition, implementation costs for this change would be minor; retail brokerages would simply need to develop a uniform template that would be provided to all retail investors.

Specific Recommendation:

9. Retail brokerages should be required to provide disclosures regarding execution quality for their customers. Relevant disclosures should include percent of shares with price improvement, effective/quoted spread ratio, and average price improvement.

b) *Disclosure Requirements for Institutional Orders*

Currently, broker-dealers that route large institutional orders are not required to make routing or execution quality disclosures for these orders. This is because in 2000, when the disclosure regime was last overhauled, institutional order routing practices were highly idiosyncratic and statistical disclosures would not have been useful for understanding their effectiveness.[399] Since 2000, the routing of institutional orders has dramatically changed. Today, institutional orders are executed by broker-dealer execution algorithms in a much more standardized process. These algorithms divide large institutional orders into many smaller orders and execute them across multiple venues, in an effort to minimize price impact and

[398] *See* Disclosure of Order Handling Information, Exchange Act Release No. 78309, File No. S7-14-16 (Jul. 13, 2016), *available at* https://www.sec.gov/rules/proposed/2016/34-78309.pdf. *See also* Press Release, U.S. SEC. & EXCH. COMM'N, SEC Proposes Rules to Enhance Order Handling Information Available to Investors (Jul. 13, 2016), *available at* https://www.sec.gov/news/pressrelease/2016-140.html.

[399] *See* SEC Division of Market Regulation, Market 2000: An Examination of Current Equity Market Developments, U.S. SEC. & EXCH. COMM'N II-14 (Jan. 1994), *available at* https://www.sec.gov/divisions/marketreg/market2000.pdf.

ultimately transaction costs for institutional investors.[400] However, without access to execution quality statistics, it remains difficult for institutional investors to assess the effectiveness of their broker-dealers. Fortunately, modern institutional order routing practices make standardized execution quality disclosures easier to provide to investors. Indeed, many broker-dealers voluntarily provide institutional customers with execution quality statistics.[401] However, the nature and extent of the information provided varies among broker-dealers.[402]

To improve transparency and broker-dealer accountability with respect to the routing and execution of institutional orders, we recommend that the SEC require standardized disclosures regarding execution quality statistics, such as price improvement and price impact. These reports should include robust and comprehensible information regarding execution quality in a uniform format. Such disclosures should improve institutional investors' ability to assess and compare broker-dealers' performance in handling orders and achieving best execution. For example, an awareness of order routing practices can help investors evaluate the potential for harmful information leakage or conflicts of interest that their broker-dealers might face in handling orders. However, determining the appropriate amount of disclosure is a careful balancing act, because the broker-dealer order routing strategies themselves are proprietary. Excessive disclosures could hinder

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[400] SEC Division of Trading and Markets, Equity Market Structure Literature Review Part II: High Frequency Trading , U.S. SEC. & EXCH. COMM'N 5 (Mar. 18, 2014), *available at* https://www.sec.gov/marketstructure/research/hft_lit_review_march_2014.pdf.

[401] *See* FIF Voluntary Execution Quality Reporting, REGONE SOLUTIONS (Jun. 25, 2015), *available at* http://www.regonesolutions.com/regone/web/localdata/WEB/DATA/WEBSECTIONS]MATTACHMENT/SITE_947//FIF-Voluntary-Execution-eversion.pdf (noting "best practices initiative involving the industry" for providing execution quality data and providing a free template for the provision of such information); *see generally* Concept Release on Equity Market Structure, Exchange Act Release No. 61358, 75 Fed. Reg. 3594, 3599 (Jan. 21, 2010).

[402] BlackRock, SEC Comment Letter, RE: Equity Market Structure Recommendations; Concept Release on Equity Market Structure, File No. S7-02-10; Regulation Systems Compliance and Integrity, File No. S7-01-13; and Equity Market Structure Review (Sept. 12, 2014), *available at* https://www.sec.gov/comments/s7-02-10/s70210-419.pdf (discussing order routing and execution metrics and stating that "market participants are still capable of monitoring execution quality").

broker-dealers' ability to offer the best strategies and compete with other brokers. Excessive disclosures could also be difficult for customers to interpret.

We therefore recommend that the SEC require broker-dealers to provide institutional customers with standardized reports that provide order routing and execution quality statistics, without disclosing specific order routing strategies. We note that representatives of buy-side and sell-side institutions have suggested a standardized template for institutional order routing disclosures by broker-dealers, and we support this template.[403] We also note that the SEC proposed a rule on July 13, 2016 that, if adopted, would provide for substantial disclosure of routing and execution quality statistics, including midpoint price improvement data related to institutional orders, and we commend the SEC for its efforts to augment investors' access to this important information.[404] However, the SEC proposal would not require the disclosure of measures of price impact, therefore our recommendation would go one step further than the SEC's proposal.

Specific Recommendation:

10. The SEC should require broker-dealers to provide institutional customers with standardized reports that provide order routing and execution quality statistics.

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[403] *See* Inv. Company Inst. et al., SEC Comment Letter, Re: Customer-Specific Order Routing Disclosures for Institutional Investors (Oct. 23, 2014), *available at* https://www.sec.gov/comments/s7-02-10/s70210-428.pdf.

[404] *See* Disclosure of Order Handling Information, Exchange Act Release No. 78309, File No. S7-14-16 (Jul. 13, 2016), *available at* https://www.sec.gov/rules/proposed/2016/34-78309.pdf. *See also* Press Release, U.S. SEC. & EXCH. COMM'N, SEC Proposes Rules to Enhance Order Handling Information Available to Investors (Jul. 13, 2016), *available at* https://www.sec.gov/news/pressrelease/2016-140.html.

c) *Update and Standardize Execution Quality Statistics*

Rule 605 currently requires trading venues to disclose the speed of execution to the tenth of a second.[405] This time increment is very slow relative to current prevailing order execution speeds, which are often in the microseconds (1 millionth of a second) for the most liquid stocks.[406] The current increment therefore does not allow for meaningful speed comparison among trading venues. The speed of a trading venue is relevant to an investor's overall costs, because a slow trading venue could take so long to execute an order that investors could miss better priced limit orders sent to another trading venue during this delay. In this regard, faster execution speeds generally benefit investors.[407]

Disclosures that accurately reflect relative trading venue speeds would provide investors with a crucial piece of execution quality data, allowing them to better assess their broker-dealers' performance. In particular, investors would be better equipped to identify and hold their broker-dealers accountable for costly or inefficient routing practices. This information would also be directly valuable to broker-dealers, who would benefit from greater awareness of slow trading venues. Therefore, to enhance trading venue reporting, we recommend that the time increment used for their execution speed disclosures be changed to milliseconds. We note that our recommendation is consistent with but goes further than the SEC's July 13, 2016 proposal to require disclosure of the average time, in milliseconds, between order entry and execution or cancellation for liquidity providing institutional orders.[408]

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[405] 17 C.F.R. § 242.605 (2005); Plan Submitted To The Securities And Exchange Commission Pursuant To Rule 11ac1-5 Under The Securities Exchange Act Of 1934, 9, *available at* https://www.nyse.com/publicdocs/nyse/regulation/nyse/Rule605Plan.pdf.

[406] Concept Release on Equity Market Structure, Exchange Act Release No. 61358, 75 Fed. Reg. 3594, 3599 (proposed Jan. 21, 2010), *available at* https://www.sec.gov/rules/concept/2010/34-61358fr.pdf.

[407] Of course, it should also be noted that the IEX trading platform is premised on a theory that intentionally slowing execution speeds can be beneficial to investors.

[408] *See* Disclosure of Order Handling Information, Exchange Act Release No. 78309, File No. S7-14-16 (Jul. 13, 2016), *available at* https://www.sec.gov/rules/proposed/2016/34-78309.pdf. *See also* Press Release, U.S. SEC. & EXCH. COMM'N, SEC Proposes Rules to Enhance Order

Specific Recommendation:

11. Trading venue disclosures should include information about execution speeds to the millisecond.

Another issue with Rule 605 and Rule 606 is the lack of uniformity with which statistical information is presented. Although the rules identify specific data points that must be included in the reports, they provide some flexibility with respect to the *format* in which the data is presented. As a result, the presentation of the reports varies among broker-dealers and trading venues. For example, the tables showing statistical information on the Rule 606 reports filed by Vanguard and E*TRADE are different.[409] If the SEC provided a template for the table into which brokerages could simply insert their data, customers would be better equipped to undertake a straightforward data comparison across firms and use these reports to understand and compare the performance of trading venues and broker-dealers.

We recommend that a standardized format for statistical information be adopted for Rule 605 and 606 reports, and for our other recommendations for new retail and institutional order disclosures. We expect that implementation and compliance costs to simply re-format reports that are already produced would be marginal. We note that, on July 13, 2016, the SEC proposed a rule that would subject disclosures regarding retail and institutional orders to certain standardized formatting requirements. The spirit of this proposal is generally consistent with our recommendation and we appreciate the SEC's work to improve and standardize investor disclosures.[410]

Handling Information Available to Investors (Jul. 13, 2016), *available at* https://www.sec.gov/news/pressrelease/2016-140.html; 17 C.F.R. § 242.606(b)(iii)(C).

[409] *See* Vanguard, *SEC Rule 606 Reports - Vanguard Brokerage Services* (2016), *available at* https://vrs.vista-one-solutions.com/sec606rule.aspx; E*TRADE, *E*TRADE Disclosure: 1Q2016* (2016), *available at* https://content.etrade.com/etrade/powerpage/pdf/OrderRouting11AC6.pdf.

[410] *See* Disclosure of Order Handling Information, Exchange Act Release No. 78309, File No. S7-14-16 (Jul. 13, 2016), *available at* https://www.sec.gov/rules/proposed/2016/34-78309.pdf. *See also* Press Release, U.S. SEC. & EXCH. COMM'N, SEC Proposes Rules to Enhance Order

Specific Recommendation:

12. Statistical information for disclosures pursuant to Rule 605 and Rule 606 and disclosures regarding institutional orders should be submitted in only one format to facilitate comparison across trading venues and among broker-dealers.

2) Market Surveillance

The ability of the SEC and FINRA to determine whether investors are obtaining the best prices for their orders is limited by their own surveillance capabilities. In particular, regulators could better perform a number of their key responsibilities if they were able to accurately track investor orders from their inception at a broker-dealer to execution on a trading venue. Enhanced surveillance capabilities would also help regulators to identify and prevent market manipulation or identify the causes of "flash crashes," as described further in Chapter 4. Investors could in turn benefit from this improved regulatory efficiency via reduced transaction costs and the more general assurance that the equity markets are working in their favor. In this section, we will describe recent efforts to enhance those capabilities.

a) *Consolidated Audit Trail*

In July 2012, the SEC adopted Rule 613,[411] which requires the exchanges and FINRA (i.e., the SROs) to develop an NMS Plan[412] to formally establish and implement the Consolidated Audit Trail (**"CAT"**).[413] The NMS Plan was initially

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Handling Information Available to Investors (Jul. 13, 2016), *available at* https://www.sec.gov/news/pressrelease/2016-140.html.

[411] Consolidated Audit Trail, 77 Fed. Reg. 45722 (Aug. 1, 2012).

[412] For a detailed explanation of SROs and national market system ("NMS") plans, *see supra* Chapter 2.

[413] Cat NMS, LLC, Limited Liability Company Agreement (Draft) 1 (Sept. 30, 2014), *available at* http://www.sec.gov/divisions/marketreg/cat-nms-agreement.pdf.

submitted to the SEC on September 30, 2014.[414] On April 27, 2016, the SEC voted to publish an amended version of the plan for public comment; the comment period expired 60 days thereafter.[415]

The CAT is intended to serve as both a consolidated order tracking system and an information repository for the SEC, allowing regulators to track a trade's order and quote specifications across trading venues, including the identities of the involved broker-dealers and customer account holders.[416] Orders and trades on exchanges and ATSs, as well orders executed via broker-dealer internalization, will be subject to the CAT data collection process, with an estimated 2,000 firms and 19 SROs reporting to the CAT.[417] The CAT will provide the full routing history for all orders, including cancelled orders.

The SEC has stated that it will use the CAT data for investigations of securities law violations; to "inform its priorities" when examining exchanges, ATSs, broker-dealers and investment advisers; to supplement data obtained during those examinations; to determine the scope and nature of any potential misconduct the examinations identify; to identify patterns of trading that could pose risks to the securities market; to perform market reconstructions; and to inform regulatory initiatives.[418] The SEC has also stated that this capability is important for evaluating whether broker-dealer best execution practices were followed,[419] and whether certain high-speed traders are engaged in manipulative trading practices.

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[414] *Id.*

[415] Press Release, U.S. SEC. & EXCH. COMM'N, SEC Seeks Public Comment on Plan to Create A Consolidated Audit Trail (Apr. 27, 2016), *available at* http://www.sec.gov/news/pressrelease/2016-77.html.

[416] U.S. SEC. & EXCH. COMM'N, Rule 613 (Consolidated Audit Trail) (Oct. 2014), *available at* http://www.sec.gov/divisions/marketreg/rule613-info.htm; *SEC Adopts Consolidated Audit Trail*, SIDLEY AUSTIN LLP 1 (Jul. 18, 2012), *available at* http://www.sidley.com/en-US/SEC-Adopts-Consolidated-Audit-Trail-07-18-2012/.

[417] Summary of the Consolidated Audit Trail Initiative (May 2015), *available at* http://www.catnmsplan.com/web/groups/catnms/@catnms/documents/appsupportdocs/p571933.pdf.

[418] Consolidated Audit Trail, 77 Fed. Reg. 45722 (Aug. 1, 2012).

[419] *Id.* at 45763.

The CAT is thus intended to address drawbacks of current trading data collection, including its fragmented nature, incompleteness, lack of timeliness, identification issues, and inconsistency in formats and content across sources.[420] Most notably, the CAT will require the exchanges, FINRA, and broker-dealers (including both ATSs and broker-dealer internalizers)[421] to abide by the same process when creating timestamps of each order (e.g., the date and time the order was "originated or received, routed out, and received upon being routed, modified, cancelled, and executed").[422] In particular, the CAT timestamp plan would ensure that transactions are timestamped at the same millisecond increment level. Such standardization avoids the problems that persist with the current regime, where timestamp accuracy varies depending on whether the trading venue or broker-dealer uses increment measurements that are greater than a millisecond.[423]

According to information published by the SROs, the CAT will handle 58 billion records daily that cover over 100 million customer accounts.[424] Importantly, Rule 613 requires that CAT trade data only be made available to the SEC and SROs regulatory staff, so the CAT can serve its intended purpose of enhancing regulatory surveillance without compromising market participants' confidential information.[425] Certain companies have bid for the right to build the audit trail, and the SROs have narrowed their choice to three bidders: FINRA, Thesys Technologies, and SunGard.[426]

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[420] *Id.* at 45722.

[421] Specifically, the requirement applies to "each national securities exchange, national securities association, and member of such exchange or association." Transactions executed on ATSs and by broker-dealer internalizers will be included in the timestamp requirement, because they are members of FINRA and/or registered exchanges.

[422] *Id.* at 45761.

[423] *Id.* at 45762.

[424] Summary of the Consolidated Audit Trail Initiative (May 2015), *available at* http://www.catnmsplan.com/web/groups/catnms/@catnms/documents/appsupportdocs/p571933.pdf.

[425] Consolidated Audit Trail, 77 Fed. Reg. 45722, 45782 (Aug. 1, 2012). *See also* 17 C.F.R. § 242.613(e)(4) (2012).

[426] Dave Michaels, *SEC Proposes Design of New Audit System to Better Catch Market Manipulation*, WALL ST. J. (Apr. 27, 2016), *available at* http://www.wsj.com/articles/sec-proposes-design-of-new-audit-system-to-better-catch-market-manipulation-1461771646?cb=logged0.8366285158622173. Notably, FINRA is teaming with Amazon Web

i. *Concerns with the CAT*

The CAT has the potential to substantially enhance regulatory oversight of the securities markets, but it is important to objectively recognize the practical issues associated with its design and implementation. For example, there will be a number of redundancies between the CAT and existing systems when the mechanism is first implemented.[427] Although some degree of overlap will be necessary for regulators to maintain uninterrupted access to necessary surveillance data, excessive redundancies will be costly, inefficient, and potentially confusing for regulators. Minimizing these redundancies should therefore be a priority in resolving the final details of CAT implementation.

Another key concern is the potential incompleteness of CAT data due to its exclusion of equity derivative products, particularly futures. The CAT as presently designed does not cover these products, although the NMS Plan does not prohibit their potential inclusion. As explained in Chapter 4, there are significant interconnections between the equity markets and futures markets. As a result, a market event in the equity markets is likely to be transmitted to the futures market, and vice versa. Furthermore, the bad actors that are the targets of surveillance efforts are likely to trade in equities and equity derivatives. Ultimately, the connections between these markets necessitate a holistic approach to oversight: and we believe that a longer term goal could be the integration of futures and other derivative products into CAT data.

ii. *Cost of the CAT*

The CAT has been and will continue to be an extraordinarily costly regulatory project. The SEC has most recently projected that the one-time total cost

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Services in pursuit of the project, while SunGard is similarly teaming with Google. *See* Bob Pisani, *It's Google vs. Amazon to create the biggest database in history*, CNBC (Apr. 27, 2016), *available at* http://www.cnbc.com/2016/04/26/its-google-vs-amazon-to-create-the-biggest-database-in-history.html.

[427] *See* Notice of Filing of the National Market System Plan Governing the Consolidated Audit Trail, Exchange Act Release No. 77724, Appendix C, 93 (Apr. 27, 2016).

to build the CAT could be up to $100 million and that industry reporting costs will be approximately $1.7 billion annually.[428] The SEC estimates that broker-dealers alone will incur approximately $2 billion in initial implementation costs and $1.5 billion in ongoing annual reporting costs.[429] A 2015 industry presentation estimates aggregate ongoing costs for the industry in the range of $2.8 billion to $3.4 billion annually.[430]

By the SEC's own estimate, broker-dealers will shoulder the lion's share of the CAT costs—exchange costs are projected to be less than 1/10th of broker-dealers' costs.[431] The unbalanced cost allocation is noteworthy for two main reasons. First, the CAT is being developed as an NMS Plan, which means that the exchanges and FINRA have significantly greater control over all facets of the CAT's evolution than do broker-dealers.[432] The CAT thus represents another crucial component of the market structure over which the exchanges have disproportionate control relative to other major market participants, such as investors and broker-dealers. Broker-dealers' relative cost burden may indeed be a consequence of their limited role in NMS Plan development.

Second, there has been inadequate analysis of the implications for *investors* of the costs that broker-dealers will incur. Indeed, the SEC's economic analysis did not determine whether any of the $2 billion in implementation costs and $1.5 billion in annual reporting costs for broker-dealers was likely to be passed on to investors.[433] Because the ultimate goal of the CAT is to serve the investing

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[428] Notice of Filing of the National Market System Plan Governing the Consolidated Audit Trail, Exchange Act Release No. 77724, 404-409 (Apr. 27, 2016).
[429] Notice of Filing of the National Market System Plan Governing the Consolidated Audit Trail, Exchange Act Release No. 77724, Appendix A, Consolidated Audit Trail National Market System Plan Request for Proposal, 470 (Apr. 27, 2016).
[430] Nicole Bullock, *The Long and Winding Road Towards An Audit Trail*, FINANCIAL TIMES (Oct. 13, 2005), *available at* http://www.ft.com/intl/cms/s/0/7bbb8580-638c-11e5-9846-de406ccb37f2.html#axzz3pgS5g3xV.
[431] Notice of Filing of the National Market System Plan Governing the Consolidated Audit Trail, Exchange Act Release No. 77724, Appendix A, Consolidated Audit Trail National Market System Plan Request for Proposal, 470 (Apr. 27, 2016).
[432] For a detailed discussion of NMS Plans and the associated process, *see supra* Chapter 2.
[433] Notice of Filing of the National Market System Plan Governing the Consolidated Audit Trail, Exchange Act Release No. 77724, 478-479 (Apr. 27, 2016).

community, the potential costs that investors will incur in its implementation are highly relevant to its success. Before finalizing the CAT, it is vital that the SEC evaluate such potential costs head-on, to confirm that the CAT will be implemented efficiently and that costs are appropriately allocated among stakeholders.

Specific Recommendation:

13. The SEC's cost benefit analysis for the Consolidated Audit Trail did not determine whether the $2 billion in implementation costs and $1.5 billion in annual reporting costs for broker-dealers would be passed on to investors. Prior to finalizing the CAT, the SEC should conduct a *publicly available* analysis that evaluates the costs and benefits of the CAT, and applies the cost benefit analysis to ensure that the CAT is implemented efficiently, with costs allocated appropriately amongst the stakeholders.

3) Odd Lots

Odd lots are trades for less than the standard trading unit of 100 shares ("round lots") and are exempt from the order protection rule.[434] Odd lot transactions have increased from 5.5% of share volume in 2005 to an average of 22.3% of share volume in 2015.[435]

The distinct regulatory treatment of odd lot transactions was initially established because odd lots traded on a separate market. The discrete odd lot market was created in an effort to provide an inexpensive and efficient order execution system compatible with the traditional odd lot investing practices of

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[434] *Responses to Frequently Asked Questions Concerning Rule 611 and Rule 610 of Regulation NMS*, U.S. SEC. & EXCH. COMM'N (2008), *available at* http://www.sec.gov/divisions/marketreg/nmsfaq610-11.htm.

[435] *U.S. Stocks Odd Lot Rate (%)*, U.S. SECURITIES & EXCH. COMM'N, *available at* http://www.sec.gov/marketstructure/datavis/ma_stocks_oddlotrate.html#.ViVXl2SrRT5 (last accessed Mar. 8, 2016). Percent represents average rates (averaging across markets) for single stocks.

small, retail customers.[436] However, this divergent structure has shifted over time. All orders now trade on the same electronic books and exchange systems treat odd lots the same as round lots for the purposes of ranking and execution.[437] Specific pricing for odd lots has been discontinued and exchanges have removed the "Odd Lot Dealer" concept.[438] Consequently, the theoretical underpinnings of subjecting odd lots to a separate regime are no longer applicable.

Today, odd lot trades receive less protection against being executed at inferior prices (trade-throughs), because they are not subject to the order protection rule. This creates an investor protection issue that especially impacts retail investors, who place the vast majority of odd lot orders.[439] Moreover, due to high share prices these odd lot orders can often be for significant sums from the perspective of the retail investor. For example, class A common stock in Alphabet Inc. (the parent company of Google), trades on NASDAQ under the ticker symbol GOOGL at a price of over $700 per share.[440] An investor who places a 50 share GOOGL order is therefore investing over $35,000, but because he is placing an odd lot order, he is not protected by the order protection rule.[441]

Furthermore, because odd lot orders are exempt from the order protection rule, they are not included as part of the NBBO. Their exclusion can reduce the accuracy of stock prices, because a substantial portion of the supply and demand for that stock is not included in the best publicly available price.[442] This concern is particularly pronounced for higher priced stocks, as odd lots represent a high percentage of trades in these stocks. For example, an analysis of Google stock in

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[436] *Odd Lot Order Requirements Memo 07-60*, N.Y. STOCK EXCH. 1 (Jun. 29, 2007), *available at* https://gset.gs.com/cgi-bin/upload.dll/file.pdf?z02a80f0azaa6bae9875d842378624f0ba3831d397.
[437] *U.S. Equity Market Structure: An Investor Perspective*, BLACKROCK 4 (Apr. 2014), *available at* https://www.blackrock.com/corporate/en-au/literature/whitepaper/viewpoint-us-equity-market-structure-april-2014.pdf.
[438] *Id.*
[439] CREDIT SUISSE, *Odd Lot (Ab)users* 2 (Feb. 12, 2014).
[440] Quote *available at* http://www.nasdaq.com/symbol/googl.
[441] BLACKROCK, *supra* note 437.
[442] *See id.* at 4.

Q3 2013 indicated that almost 60% of Google trades were odd lot executions, constituting over 25% of the stock's share volume.[443]

Given that odd lot trades occur more frequently among higher priced stocks and that the significance of trade size for retail investors is measured by the total cost to the investor rather than the number of shares, we recommend redefining odd lots according to dollar amount spent by an investor, instead of the 100 share standard. Specifically, we propose that an odd lot dollar value threshold be set, and that trades for more than that amount be made subject to the order protection rule. For example, while it might not be efficient to extend the order protection rule to a trade for 25 shares of a stock trading around $1.00, it likely would be efficient to extend this rule to a similarly-sized trade for GOOGL, which would represent a roughly $18,000 investment. This moderate reform would likely improve execution quality for investors at minimal cost.

Redefining odd lots would also improve the accuracy of important market quality metrics. For example, scholars have found that odd lot transactions engender exclusion bias, whereby measures of order imbalance (i.e., the mismatch between the number of buy and sell orders for a particular security) and investor sentiment (i.e., the mindset of the market based on price movements) are misstated as a result of odd lots not being reported.[444] Order imbalance and investor sentiment are consistently used to construct key macro market measurements such as "stock returns," "momentum," and "market inefficiencies." Redefining odd lots would therefore improve the accuracy of these macro measurements, which are used to assess overall market developments and trends.

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[443] *Id.* at 4.

[444] Maureen O'Hara et al., *What's Not There: The Odd-Lot Bias in TAQ Data*, Johnson School Research Paper Series No. 31-2011, Midwest Finance Association 2012 Annual Meetings Paper, 1 (2011, *available at* http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1892972).

Specific Recommendation:

14. The SEC should pass a rule applying the order protection rule to odd lot transactions above a threshold dollar amount, instead of a threshold share amount.

Part II: The Access Rule

The order protection rule and the duty of best execution would be ineffective if broker-dealers were unable to *access* trading venues for their customers in a fair and efficient manner. Rule 610 of Reg NMS sets forth the rules by which market participants may access trading venues. It is based on an approach whereby broker-dealers establish private linkages to trading venues in order to route customer orders across the national marketplace.[445] Broker-dealers actively monitor liquidity at many different venues and use algorithmic order routing strategies to quickly and efficiently route investor orders to venues with liquidity.

Sophisticated market participants can also obtain "sponsored" access, whereby they use a broker-dealer's identification to obtain direct access to exchanges and other trading venues.[446] According to the SEC, sponsored access accounted for 50 percent of overall average daily trading volume in the U.S. equities market in 2010.[447] Although the terms of sponsored access are privately negotiated between broker-dealers and market participants, Rule 15c3-5 imposes certain minimum standards on these arrangements.[448] For example, broker-dealers may only provide a market participant with sponsored access if the broker-dealer has established reasonable credit and capital thresholds.[449] The broker-dealer must also maintain risk management controls and supervisory procedures for the market

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[445] Concept Release on Equity Market Structure, Exchange Act Release No. 61358, File No. S7-12-98 27-28 (Jan. 14, 2010), *available at* https://www.sec.gov/rules/concept/2010/34-61358.pdf.
[446] Risk Management Controls for Brokers or Dealers with Market Access, Exchange Act Release No. 63241, File No. S7-03-10 (Nov. 3, 2010), *available at* https://www.sec.gov/rules/final/2010/34-63241.pdf;17 C.F.R. § 240.15c3–5 (2010).
[447] *Id.*
[448] *Id.*
[449] *See* 17 C.F.R. § 240.15c3–5 (2010).

participant.[450] These standards are intended to mitigate the risk that a market participant with sponsored access could cause solvency concerns for the broker-dealer or volatility in the markets.[451]

A. Access Fees

Trading venues have the authority to impose "access fees" on market participants that execute trades on their platforms.[452] Importantly, these access fees are not included as part of the publicly displayed price and there is a risk that high access fees could decrease the accuracy of publicly displayed prices and increase transaction costs for investors. In order to mitigate this risk, the SEC implemented an access fee cap of 30 cents/100 shares for publicly displayed orders in Rule 610 of Reg NMS.[453] The 30 cent cap was chosen because it was consistent with prevailing access fees charged at the time of Reg NMS's adoption.[454]

Although ATSs generally do not disclose their fees and they often vary depending on the market participant, in practice we estimate that they typically charge access fees of between 5-10 cents/100 shares. Broker-dealer internalizers often *pay* to attract order flow, and generally do not charge access fees. However, exchanges generally use a pricing system referred to as "maker-taker," whereby they charge certain market participants the regulatory maximum fee of 30 cents/100 shares. We describe this pricing system below.

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[450] *Id.*

[451] Risk Management Controls for Brokers or Dealers with Market Access, Exchange Act Release No. 63241, File No. S7-03-10 94-97 (Nov. 3, 2010), *available at* https://www.sec.gov/rules/final/2010/34-63241.pdf.

[452] *See* Memorandum from SEC Division of Trading and Markets to SEC Market Structure Advisory Committee, Maker-Taker Fees on Equities Exchanges, U.S. SEC. & EXCH. COMM'N 29 (Oct. 25, 2015), *available at* https://www.sec.gov/spotlight/emsac/memo-maker-taker-fees-on-equities-exchanges.pdf.

[453] *See id.*

[454] *See id*; *see also* Larry Harris, *Maker-Taker Pricing Effects on Market Quotations*, USC MARSHALL SCHOOL OF BUSINESS 5 (Nov. 14, 2013), *available at* http://bschool.huji.ac.il/.upload/hujibusiness/Maker-taker.pdf.

B. Maker-Taker Pricing System

Exchanges use the maker-taker pricing system to increase liquidity at the exchange, because the more liquidity that an exchange has in a certain stock, the more likely it is that the exchange can execute a trade in that stock. Of course, exchange earnings depend on trading volumes. So, exchanges pay market participants to encourage them to provide liquidity to the exchange and fund these payments by charging access fees to the market participants that "take" liquidity from the exchange.[455] The access fees charged by exchanges are typically close to the 30 cent maximum and the rebates paid to liquidity providers are close to 20 cents.[456] Exchanges earn the difference between the access fees and the rebates. A minority of exchanges use the "taker-maker" pricing system, which is the opposite of "maker-taker" (i.e., liquidity "makers" pay a fee and liquidity "takers" receive a rebate).[457]

[455] For example, a "maker" sends a limit order to the venue, thus adding liquidity to the order book. The "taker" sends a market order to the venue that executes against the standing limit order, thus removing liquidity from the order book.
[456] Memorandum from SEC Division of Trading and Markets to SEC Market Structure Advisory Committee, Maker-Taker Fees on Equities Exchanges, U.S. SEC. & EXCH. COMM'N 29 (Oct. 25, 2015), *available at* https://www.sec.gov/spotlight/emsac/memo-maker-taker-fees-on-equities-exchanges.pdf.
[457] *See infra* Figure 3.2.

Figure 3.2: Maker-Taker and Taker-Maker Arrangements[458]

Exchange	Take Fee (Take Rebate)[459] $ per 100 shares	Make Fee (Make Rebate) $ per 100 shares
BATS Z	0.30	(0.20)
BATS X	(0.15)	0.18
EDGE X	0.29	(0.20)
EDGE A	0.30	0.05
NASDAQ	0.30	(0.21)
NASDAQ BX	(0.06)	0.20
NYSE Arca	0.30	(0.20)
NYSE	0.27	(0.14)

In theory, the maker-taker pricing system should be effective at increasing liquidity at an exchange, because liquidity providers can profit from liquidity rebates and so they are incentivized to send orders to an exchange. By encouraging the public display of liquidity, the maker-taker pricing system can also lower bid-ask spreads for stocks and transaction costs for investors. Liquidity rebates also allow exchanges to compensate liquidity providers for the *signaling risk* that they incur when publicly displaying an order. Signaling risk is particularly significant on exchanges because all other market participants can see publicly displayed orders. On ATSs and broker-dealer internalizers, signaling risk is lower because orders are typically not displayed to all market participants.

1) Criticisms of the Maker-Taker Pricing System

Although the maker-taker pricing system can incentivize the public display of liquidity, high access fees can have other less desirable side effects on market quality. First, the maker-taker pricing system can contribute to market

[458] *Stocks, ETFs and Warrants – Tiered Pricing Structure*, INTERACTIVE BROKERS, *available at* https://www.interactivebrokers.com/en/index.php?f=commission&p=stocks2. Pricing can also vary by order type, share price, and volume tiers. We selected pricing arrangement for common displayed orders for shares with prices above $1.00 (last accessed Jul. 15, 2016).

[459] A negative take fee is essentially a take rebate; a negative make fee is essentially a make rebate.

complexity by producing a growth in order types.[460] Second, high exchange access fees may interfere with the public display of orders by discouraging market participants from trading on exchanges.[461]

a) *Market Complexity*

Order types have grown in number and complexity over the past decade, as set forth in detail in Figure 3.3. Maker-taker pricing has played a role in this recent proliferation, as order types often determine whether a market participant captures a liquidity rebate or pays an access fee.[462] For example, NASDAQ's "post only" orders are designed to execute only when the market participant would be deemed a liquidity provider (i.e. a maker) and therefore earn the liquidity rebate and not incur an access fee.[463] Other exchanges have implemented similar order types that are designed to help traders avoid execution when doing so would incur an access fee.[464]

Our review of exchange rulebooks illustrates the explosion in order types. Exchange rules describing orders and their execution are now almost twice the length of Reg NMS itself.[465] NYSE increased its order rule amendment rate by a factor of seven after the introduction of Reg NMS and Figure 3.3 shows that the rate of order type creation does not appear to have abated in recent years.[466]

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[460] Memorandum from SEC Division of Trading and Markets to SEC Market Structure Advisory Committee, Maker-Taker Fees on Equities Exchanges, U.S. SEC. & EXCH. COMM'N 21-27 (Oct. 25, 2015), *available at* https://www.sec.gov/spotlight/emsac/memo-maker-taker-fees-on-equities-exchanges.pdf.

[461] *See id.* at 11-13 (discussing the increase in off-exchange trading and the role of rebates as the exchanges' primary tool to compete with off-exchange venues).

[462] *Id.* at 22-24.

[463] *Id.*

[464] *See, e.g.*, BATS Rule 11.9(c)(6) (BZX Post Only Order), *available at* http://cdn.batstrading.com/resources/regulation/rule_book/BATS_Exchange_Rulebook.pdf (describing a post-only order type similar to the NASDAQ post-only. BATS also offers a partial post-only limit order).

[465] *See, e.g.*, Notice of Filing of Proposed Rule Change to Amend NYSE Arca Equities Rules 7.31, 7.32, 7.37, and 7.38 in Order to Comprehensively Update Rules Related to the Exchange's Order Types and Modifiers, Exchange Act Release No. 70637 (Oct. 9, 2013), *available at* https://www.sec.gov/rules/sro/nysearca/2013/34-70637.pdf.

[466] *Id.*

Moreover, exchanges offer "optional attributes" and "modifiers" that multiply the effective number of order types. The number of permutations for interactions between order types and modifiers is virtually impossible to measure and can be difficult for broker-dealers to manage.

Figure 3.3: Order Types Are Numerous, Complex, and Frequently Changing[467]

Exchange	Order Types	Modifiers	Type X Modifier	Amendment per year Pre-NMS	Amendment per year Post-NMS	Length Compared to Reg NMS
BATS	33	6	198	---	5.1	181%
NASDAQ	13	13	169	---	11.1	479%
NYSE	13	7	91	0.5	7.9	154%
NYSE Arca	29	15	435	4.3	5.9	138%
Average	**25**	**10.3**	**223**	**2.4**	**7.5**	**238%**

Figure 3.3: The Pre-NMS period ends the last day before Reg NMS's effective date of August 29, 2005. Results do not change qualitatively after excluding the NMS implementation period. Length compares word count of exchange's order/modifier and execution rules to word count of core Reg NMS rules: Order Protection Rule (611); Access Rule (610); Sub-Penny Rule (612); Market Data Rules (601-603).

While innovative responses to competition are generally a sign of a healthy market, these order types add to market complexity and can reduce transparency for investors. Order types essentially allocate fees among market participants rather than reducing transaction costs overall. Indeed, the complexity that they create arguably increases costs to the system. For example, broker-dealers acting on behalf of institutional investors may need to invest resources in studying new order types and employing strategies to minimize access fees. Additionally, exchanges expend resources to design and implement new order types. In some regards, these complex and constantly changing order types therefore seem to run counter to the

[467] CCMR staff analysis of NYSE Rules 13 and 1000-1004; NYSE Arca Rules 7.31 and 7.35; NASDAQ Rules 4702-4703 and 7018; and BATS Rules 11.9 and 11.13, as of June 2016.

Exchange Act objective of ensuring the "economically efficient execution of securities transactions."[468]

The access fees and liquidity rebates themselves are also regularly updated. This includes pricing changes for particular market participants based on the volume that those market participants trade on an exchange. Volume-based pricing changes are often determined according to multiple "tiers" and these tiers are based on volume measured over a calendar month.[469] Numerous volume tiers may add further uncertainty and complexity to the marketplace, as market participants must update their routing tables to accommodate pricing changes.[470] The complexity of order types and maker-taker pricing schedules also makes it difficult for exchanges to meet their Exchange Act obligation to clearly describe their rules and proposed rule changes in public filings. This issue has been the subject of recent enforcement actions that certain exchanges have settled with the SEC.[471]

b) *High Exchange Access Fees and Dark Trading*

Another concern with the maker-taker pricing system is that high access fees may actually be discouraging the public display of orders. This is because liquidity "takers" (such as institutional and retail investors) must pay high access fees to trade on an exchange, and so broker-dealers executing orders for liquidity takers may opt to execute customer orders internally or at an ATS to avoid exchange fees. Indeed, in recent years, exchanges have lost substantial trading volume to ATSs and broker-dealer internalizers. For example, off-exchange execution of NYSE

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[468] 15 U.S.C. § 78k–1(a)(1)(C) (2012).

[469] Memorandum from SEC Division of Trading and Markets to SEC Market Structure Advisory Committee, Maker-Taker Fees on Equities Exchanges, U.S. SEC. & EXCH. COMM'N 28 n.118 (Oct. 25, 2015), *available at* https://www.sec.gov/spotlight/emsac/memo-maker-taker-fees-on-equities-exchanges.pdf.

[470] *See id.*

[471] Memorandum from SEC Division of Trading and Markets to SEC Market Structure Advisory Committee, Maker-Taker Fees on Equities Exchanges, U.S. SEC. & EXCH. COMM'N 26 (Oct. 25, 2015), *available at* https://www.sec.gov/spotlight/emsac/memo-maker-taker-fees-on-equities-exchanges.pdf.

stocks increased from 13% in 2005 to 35% in 2014.[472] Similarly, off-exchange execution of NASDAQ stocks increased from 29% in 2005 to 39% in 2014.[473]

It is clear from the fact that exchanges are charging the regulatory maximum in access fees that they have not sought to compete with ATSs or broker-dealer internalizers by lowering the fees that they charge liquidity takers. We believe that the reason exchanges have failed to reduce access fees is that doing so could make an exchange less competitive vis-à-vis other exchanges. This is because if an exchange were to decrease access fees, it would need to concurrently reduce rebates (which are funded by access fees). A reduction in rebates could drive liquidity suppliers away from that exchange and encourage them to instead post those orders at another exchange, where rebates are higher. Thus, if an exchange were to compete with ATSs and broker-dealer internalizers by lowering access fees, it would likely lose market share in publicly displayed orders to other exchanges.

The NASDAQ's recent pilot program to reduce certain access fees and rebates is illustrative.[474] The program lowered fees and rebates for 14 highly liquid stocks.[475] As one might expect, NASDAQ was observed to have lost market share

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[472] Memorandum from SEC Division of Trading and Markets to SEC Market Structure Advisory Committee, Maker-Taker Fees on Equities Exchanges, U.S. SEC. & EXCH. COMM'N 11-12 (Oct. 25, 2015), *available at* https://www.sec.gov/spotlight/emsac/memo-maker-taker-fees-on-equities-exchanges.pdf.

[473] Although much of this loss in order flow may relate to higher relative access fees at exchanges, it is important to also note that exchanges cannot provide exclusive access to select market participants like ATSs or broker-dealer internalizers. Thus, for investors who are most concerned with controlling who is on the other side of their trades, trading via an ATS or broker-dealer internalizer in the dark is often preferable to trading on an exchange regardless of whether the access fee is lower on an exchange.

[474] Luis A. Aguilar, Commissioner, U.S. SEC. & EXCH. COMM'N, Public Statement, U.S. Equity Market Structure: Making Our Markets Work Better for Investors (May 11, 2015) (quoting Exchange Act Release No. 73967), *available at* https://www.sec.gov/news/statement/us-equity-market-structure.html.

[475] *Id.*; *see* John McCrank, *Nasdaq names 14 stocks to test lower fee and rebate program*, Reuters (Nov. 17, 2014), *available at* http://www.reuters.com/article/2014/11/17/nasdaq-omx-fees-idUSL2N0T71GG20141117.

to other exchanges.[476] The maker-taker pricing system therefore appears to create a first-mover disadvantage that deters exchanges from reducing access fees. Indeed, several exchange representatives have expressed a desire to reduce access fees, but a practical inability to do so.[477]

C. Reducing the Access Fee Cap

The existing 30 cent access fee cap was intended to reflect market conditions in 2004,[478] but in the intervening decade, access fees have grown to represent a greater fraction of overall transaction costs.[479] We believe that reducing the access fee cap could reduce exchanges' incentive to frequently change order types and potentially encourage certain market participants to trade in lit markets.

We believe that it would be best for the SEC to consider reducing the access fee cap for the most liquid stocks, as there is likely sufficient fundamental supply and demand for these stocks that a high rebate is unnecessary to incentivize the public display of orders and to maintain narrow bid-ask spreads. At the same time, such a reduction in access fees could significantly benefit investors. For example, recent estimates are that reducing the access fee cap to 5 cents for only the most liquid stocks would decrease transaction costs by $850 million annually.[480]

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[476] Nasdaq primarily lost market share to NYSE's Arca exchange, but BATS and Edge X also benefitted from Nasdaq's pilot program. Gary Stone, *Two Weeks Into the Market Structure Experiment... Results are Mixed*, BLOOMBERG TRADEBOOK (Feb. 19, 2015), *available at* http://www.bloombergtradebook.com/blog/two-weeks-experiment/.

[477] Sarah N. Lynch, *Nasdaq CEO says maker-taker model has value, but fees too high*, Reuters (Jul. 28, 2014), *available at* http://www.reuters.com/article/2014/07/28/nasdaq-omx-congress-marketsrulesidUSL2N0Q31FH20140728.

[478] *See* Memorandum from SEC Division of Trading and Markets to SEC Market Structure Advisory Committee, Maker-Taker Fees on Equities Exchanges, U.S. SEC. & EXCH. COMM'N 29 (Oct. 25, 2015), *available at* https://www.sec.gov/spotlight/emsac/memo-maker-taker-fees-on-equities-exchanges.pdf.

[479] *See* Aguilar, *supra* note 474.

[480] John McCrank, *Exchange Operator BATS Calls for U.S. Regulatory Reform*, REUTERS (Jan. 6, 2015), *available at* http://www.reuters.com/article/2015/01/06/us-bats-markets-reform-idUSKBN0KF25920150106.

Implementing a tailored approach for a fee reduction would require the consideration of appropriate groupings. For example, under a liquidity-based approach, securities could be segmented based on average daily volume over a fixed period of time, market capitalization, inclusion in certain indices (e.g., the Standard & Poor's 500 or the Russell 1000), security type (e.g., operating company, exchange traded fund, closed-end fund), or some combination thereof.[481] A process would also need to be developed to periodically reassess and update the list of securities that would qualify.[482]

Rather than immediately reducing access fees for a select sub-group, we believe that the SEC should first conduct a pilot program to measure the potential impact that such a change would have on market quality and trading behavior. We support the EMSAC Regulation NMS Subcommittee's recommended framework for an access fee cap pilot program that was submitted to the SEC on July 8, 2016.[483] Although pilot programs can impose significant costs on market participants, we believe that this approach would most efficiently identify the optimal parameters of a lower access fee cap. In addition, these costs can be mitigated with the use of the infrastructure and data from pilots already planned or underway, such as the "Tick Size Pilot Program" program described below.

Specific Recommendation:

15. The SEC should implement a pilot program to evaluate the impact of a reduction in access fees and liquidity rebates on market quality and trading behavior. The structure of the pilot should generally conform to the

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[481] Memorandum from SEC Division of Trading and Markets to SEC Market Structure Advisory Committee, Maker-Taker Fees on Equities Exchanges, U.S. SEC. & EXCH. COMM'N 32-33 (Oct. 25, 2015), *available at* https://www.sec.gov/spotlight/emsac/memo-maker-taker-fees-on-equities-exchanges.pdf.

[482] *Id.*

[483] *See* Memorandum from EMSAC Regulation NMS Subcommittee to Equity Market Structure Advisory Committee (EMSAC), Framework for Potential Access Fee Pilot, U.S. SEC. & EXCH. COMM'N (Apr. 19, 2016); Equity Market Structure Advisory Committee (EMSAC), Regulation NMS Subcommittee Recommendation for an Access Fee Pilot, U.S. SEC. & EXCH. COMM'N (Jun. 10, 2016), *available at* https://www.sec.gov/spotlight/emsac/emsac-regulation-nms-recommendation-61016.pdf; Ackerman, *supra* note 271.

framework proposed by the Equity Market Structure Advisory Committee Regulation NMS Subcommittee and leverage existing pilots as appropriate.[484]

D. Aligning Maker-Taker with the Disclosure Regime

Neither the duty of best execution nor the order protection rule specifies where a trade must occur if several trading venues are displaying the best publicly available price. Previously, this ambiguity was problematic in the context of the maker-taker system, because broker-dealers may have prioritized the execution of customer orders on venues with the highest rebates or lowest fees. This was a concern for investors, because the venues that offer the highest rebates or lowest fees may not provide the best execution of customer orders given the type of order flow that they tend to attract, according to some academic studies.[485]

Fortunately, both FINRA and the SEC have recently taken measures that should mitigate these concerns. FINRA took action in November 2015 to clarify the duty of best execution in the context of maker-taker. In Regulatory Notice 15-46, FINRA made clear that access fees and liquidity rebates should not interfere with broker-dealers' duty of best execution and should not "inappropriately affect their routing decisions."[486] In July 2016, the SEC proposed changes to required broker-dealer disclosures that, if enacted, would improve transparency surrounding access fees and liquidity rebates. Specifically, the proposal would require the disclosure of access fees and rebates associated with both institutional and retail orders. For institutional reporting, broker-dealers would have to report average net execution fees or rebates (per 100 shares).[487] For retail reporting, broker-dealers

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[484] Citadel dissents from this recommendation.

[485] Robert H. Battalio et al., *Can Brokers Have It All? On the Relation Between Make-Take Fees and Limit Order Execution Quality* (Working Paper, 2012), *available at* http://ssrn.com/abstract=2367462.

[486] FINRA, Regulatory Notice No. 15-46, Best Execution 6 (Nov. 2015), *available at* http://www.finra.org/sites/default/files/notice_doc_file_ref/Notice_Regulatory_15-46.pdf.

[487] *See* Disclosure of Order Handling Information, Exchange Act Release No. 78309, File No. S7-14-16 (Jul. 13, 2016), *available at* https://www.sec.gov/rules/proposed/2016/34-78309.pdf. *See also* Press Release, U.S. SEC. & EXCH. COMM'N, SEC Proposes Rules to Enhance Order Handling Information Available to Investors (Jul. 13, 2016), *available at* https://www.sec.gov/news/pressrelease/2016-140.html.

would have to report both the fees paid (per share) and the rebates received (per share and in total) for orders routed to the venues that receive the most order flow from the reporting broker-dealer.[488]

While the July 2016 SEC proposal would enhance disclosure requirements surrounding maker-taker pricing, reporting requirements should be further amended so that broker-dealers must clarify *how* access fees and liquidity rebates impact their routing practices. This should include an explanation of how broker-dealers' routing decisions are consistent with their duty of best execution in light of the recent FINRA guidance. Broker-dealers should also be required to clarify whether they pass through liquidity rebates or access fees to their customers.

Specific Recommendation:

16. Broker-dealers should be required to disclose how access fees and liquidity rebates affect order routing practices and transaction costs for their customers.

Part III: The Sub-Penny Rule

Tick sizes are the minimum price variation (**"MPV"**) for *quotations* for stocks. During the mid-1990s, the majority of exchanges set tick sizes at fractions (e.g., 1/8th) of a dollar.[489] In June 2000, the SEC issued an order directing the exchanges to jointly develop a plan to convert their quotations for stocks from

[488] *See supra* note 487.

[489] In 1994, NYSE Rule 62 set the MPV for stocks with a share price above $1.00 at 1/8th of a dollar. AMEX Rule 127 set an MPV of 1/16th of a dollar for stocks with a price below $5.00 and 1/8th for other stocks. NASD, the forerunner to FINRA, did not have a MPV rule for NASDAQ stocks, but the NASDAQ system was set up to process spreads of 1/32nd of a dollar for stocks with a bid below $10.00 and 1/8th of a dollar for other stocks. *See* SEC Division of Market Regulation, Market 2000: An Examination of Current Equity Market Developments, U.S. SEC. & EXCH. COMM'N 37 n.43 (Jan. 1994), *available at* https://www.sec.gov/divisions/marketreg/market2000.pdf.

fractions to decimals.[490] The primary motivating factor for this change was that fractional tick sizes were creating wide spreads, thereby increasing transaction costs for investors.[491] By April 2001, the exchanges had implemented $.01 MPV rules, completing the move to decimalization.[492] Although exchanges required pricing in $.01 increments, ATSs were still permitted to accept orders in sub-penny increments.[493] This practice ended in 2005, when the SEC adopted the sub-penny rule of Reg NMS, which generally prohibits any trading venue from displaying, ranking, or accepting orders in increments smaller than one penny.[494] The move to the $.01 MPV significantly reduced spreads and transaction costs for investors.[495]

Importantly, trading venues are allowed to *execute* orders at any pricing increment. And one might wonder why regulators have chosen to impose a minimum tick size on quotations—indeed, why should market participants not be allowed to price their orders as accurately as possible? According to the SEC, there are two problems associated with quoting stock prices in increments of less than a penny: flickering quotations and stepping ahead.[496]

Flickering quotations occur when the price for a stock repeatedly moves back and forth between prices (e.g., between $10.001 and $10.002).[497] This is a

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[490] *See* Order Directing the Exchanges and the National Association of Securities Dealers, Inc. to Submit a Phase-In Plan to Implement Decimal Pricing in Equity Securities and Options, Exchange Act Release No. 42914, 65 Fed. Reg. 38010 (Jun. 8, 2000), *available at* https://www.sec.gov/rules/other/34-42914.htm.

[491] *See* Report to Congress on Decimalization, As Required by Section 106 of the Jumpstart Our Business Startups Act, U.S. SEC. & EXCH. COMM'N 4-5 (July 2012), *available at* https://www.sec.gov/news/studies/2012/decimalization-072012.pdf.

[492] *Id.*

[493] In 2002, the Top of the Island ECN publicly displayed its limit order book with quotes in $.0001 increments. LARRY HARRIS, TRADING AND EXCHANGES 73 (Oxford University Press: 2003). A more extensive discussion of post-decimalization, pre-NMS ECN sub-penny quotes and trades is *available at* https://www.sec.gov/rules/proposed/s71004/bchakrabarty1.pdf.

[494] Rule 612(a) applies to stocks priced above $1.00; Rule 612(b) applies a different set of tick size rules to stocks with a share price below $1.00. *Compare* 17 C.F.R. § 242.612(a) (2005) *with* 17 C.F.R. § 242.612(b (2005).

[495] Regulation NMS, Exchange Act Release No. 51808, 70 Fed. Reg. 37496, 37556 (Jun. 29, 2005), *available at* https://www.sec.gov/rules/final/34-51808fr.pdf.

[496] *Id.* at 37503-37504.

[497] *Id.* at 37503.

problem for equity markets because it can complicate order routing decisions for broker-dealers and hinder their ability to get the best prices for investors.[498] It also strains market infrastructure, including market data feeds and private linkages established by broker-dealers.[499]

Second, without a minimum tick size for quotations, investors would be vulnerable to a trading strategy known as quote-matching or stepping ahead.[500] In this strategy, a trader uses an economically insignificant tick to "step ahead" of an existing order, so that the trader's order is filled prior to or instead of that order. This means that the orders posted by fundamental investors and liquidity suppliers are less likely to get executed. This can disincentivize the public display of orders by these investors and liquidity suppliers and can thereby increase bid-ask spreads and transaction costs.

However, tick sizes can also be too wide, as they were when fractional MPVs prevailed. A tick size that is too wide sets a floor on the range of permissible bid-ask spreads, which can increase transaction costs for investors. For example, suppose that the minimum tick size is fixed at $.05 and the best publicly displayed offers to buy and sell a stock are $10.00 and $10.05. Further suppose that there is sufficient supply and demand for this stock such that there would otherwise be publicly displayed offers to buy and sell the stock at prices within the 5 cent tick, such as $10.02 and $10.03). In this example, due to the minimum tick size of $.05, an investor's bid to buy the stock could be executed at $10.05, instead of $10.03. Thus, it could cost an investor an additional 2 cents to buy the same stock under a 5 cent tick regime than it would have cost the investor if penny spreads prevailed.

When artificially wide tick sizes exist, there is also a greater incentive to execute trades in these stocks in the dark, because investors can get better prices for their orders by trading in the dark. This is because the SEC does not prohibit execution within the minimum tick size--they only prohibit pricing

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[498] *See id.* at 37553.
[499] *See id.*
[500] Harris, *supra* note 493, at 250.

orders/quotations in sub-pennies.[501] Exchanges and ATSs can use dark "mid-point match" order types to execute in sub-penny increments. Broker-dealer internalizers can offer sub-penny executions by entering into contractual agreements (e.g., PFOF agreements with retail brokerages) that provide that orders will receive sub-penny price improvement.[502]

The appropriate minimum tick size for a stock largely depends on the stock's natural spread, which is based on its fundamental supply from sellers and demand from buyers. Stocks that have significant supply and demand generally have narrow natural spreads, because buyers or sellers of that stock can easily find a counterparty with whom they can transact in order to enter or exit their positions. Stocks with narrow natural spreads typically include large capitalization U.S. companies. Alternatively, stocks with low fundamental supply and demand generally have wide natural spreads, because it is more difficult for buyers and sellers to find counterparties willing to trade. Stocks with wide natural spreads typically include small capitalization U.S. companies.

For example, if the natural spread of a stock is 5 cents, then the ideal tick size for that stock would also be 5 cents. This tick size would allow buyers and sellers to trade efficiently, without exposure to the risks posed by artificially narrow ticks (e.g., having a trader "step ahead")[503] or artificially wide ticks (e.g., high transaction costs from wide spreads).[504] However, determining each stock's natural spread and using that information to set the ideal tick size for each stock is

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[501] *See* 17 C.F.R. § 242.612 (2005).

[502] Robert N. Rapp, *NYSE program approved to permit sub-penny stock prices to benefit retail investors*, Calfee Halter & Griswold LLP (Jul. 17 2012) ("Today, orders to buy or sell securities by retail investors are routinely routed by their retail securities brokers not to national securities exchanges, but rather to over-the-counter (OTC) wholesale market makers who have agreed to pay the brokers for the order flow -- all part of a process known as "internalization" of orders by retail brokers. Wholesale market makers are permitted to execute retail orders routed to them at "sub-penny" prices, meaning that trades may occur using price increments as low as $0.001 versus the market makers displayed quotations priced in whole pennies."), *available at* http://www.lexology.com/library/detail.aspx?g=49fa94b9-4d68-4ea3-81a9-57c4ccd24347.

[503] Regulation NMS, Exchange Act Release No. 51808, 70 Fed. Reg. 37496, 37551 (Jun. 29, 2005), *available at* https://www.sec.gov/rules/final/34-51808fr.pdf.

[504] *Id.* at 37552-37554.

not practicable. The natural supply and demand for each stock is difficult to identify with precision, is different for each stock, and changes over time. Because of this difficulty, the SEC takes a "one-size fits all" approach, which is not responsive to a stock's individual liquidity characteristics.

A. Reducing Minimum Tick Sizes

The SEC has acknowledged that the trading characteristics of certain stocks could warrant sub-penny quotations.[505] More specifically, the SEC notes that there are strong indications that the minimum tick size of one penny is too wide for a stock if the stock always trades with a penny spread and always has significant depth on both sides of the market.[506]

We believe that certain highly liquid stocks demonstrate both of the abovementioned trading characteristics. First, as demonstrated by Figure 3.4 below, even during instances of high market volatility, including the 2008 financial crisis, certain highly liquid stocks always trade at penny spreads. Indeed, the fact that the spread of these stocks does not adjust to extreme instances of market-wide volatility, like the 2008 financial crisis, strongly suggests that penny increments may be artificially expanding their spreads. Second, as demonstrated by Figure 1.9 in Chapter 1 (renamed Figure 3.5 below), there is consistently substantial depth (offers to buy and sell) on both sides of the NBBO for the most liquid stocks.

[505] *Id.* at 37551.
[506] *Id.* at 37554.

Figure 3.4: Quantiles of NBBO Spread over Time[507]

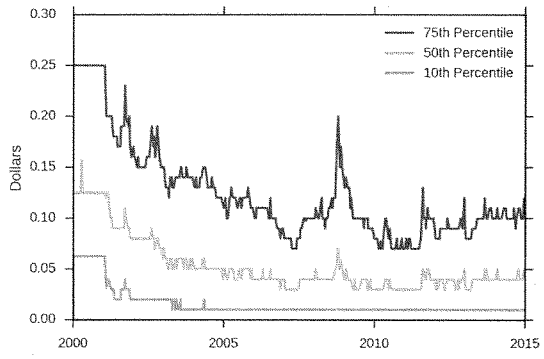
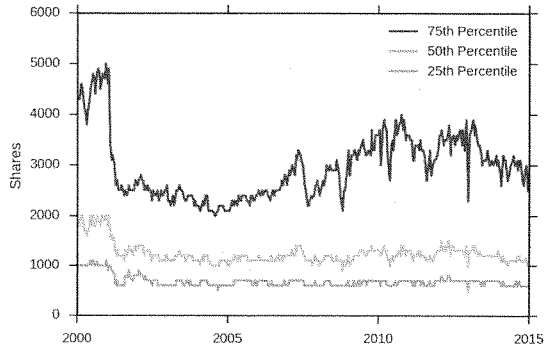


Figure 3.5: Volume Depth Available at NBBO[508]



However, it is important to note that decreasing a stock's tick size may have certain unintended consequences. For example, smaller tick sizes could lead to

[507] Source: TAQ database.
[508] Source: TAQ database.

increased data traffic flows, particularly during times of heightened market volatility, and could complicate broker-dealer order routing. The collateral consequences of reducing tick sizes could indeed detract from the potential benefits to the markets that such a change could otherwise produce.

We therefore recommend that the SEC implement a pilot program for reducing the tick size for certain highly liquid stocks from $0.01 to $0.005. The SEC should include a control group of highly liquid stocks that would continue to trade at one cent ticks, in order to compare trading in these stocks against the stocks that would trade at half cent ticks. The pilot program for highly liquid stocks should *not* include a trade-at rule, as this would create unnecessary complexity and could compromise the integrity of the pilot data.

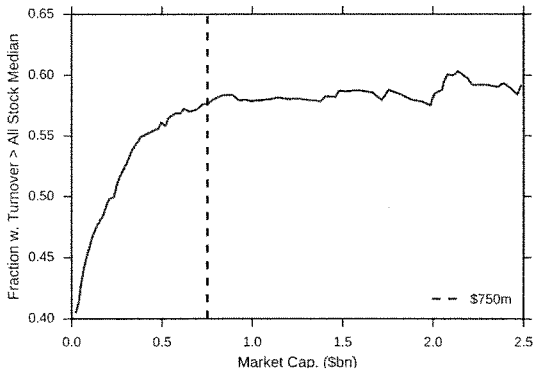
Specific Recommendation:

17. After concluding the access fee pilot, the SEC should conduct a pilot program for reducing the tick size for highly liquid stocks. The pilot should include a control group and should not include a trade-at rule.

B. Increasing Minimum Tick Sizes

As mentioned above, the stocks of companies with small market capitalizations ("small cap" companies) are more likely to have wider natural spreads, because there is lower supply and demand for these stocks from investors. Figure 3.6 demonstrates that as a stock decreases in capitalization, so does its liquidity, as measured by stock turnover (fraction of a stock's market capitalization that is traded in one day). One concern is that because these stocks lack substantial liquidity, small cap companies may be discouraged from publicly listing their stocks, thereby foregoing a valuable potential source of capital and excluding public investors from the opportunity to fuel their growth.

Figure 3.6: Liquidity is lower for small capitalization stocks[509]



In 2011, Congress expressed concerned that the one-cent MPV was contributing to low liquidity in small cap stocks.[510] It directed the SEC to study the effects of decimalization on small cap stocks and to widen spreads if necessary.[511] The SEC concluded that decimalization was generally associated with positive effects on market quality, but also noted that it is difficult to separate the effects of decimalization from other factors like the contemporaneous trend towards automation.[512] After further pressure from Congress[513] and other commenters,[514]

[509] Source: CRSP database. Compares stocks eligible for the Tick Size Pilot Program (discussed below) to all stocks. Pilot-eligible securities are US domiciled common stocks with a share price greater than $2.00, a market capitalization of $5 billion or less, and a daily volume of one million shares or less.

[510] *See* Report to Congress on Decimalization, As Required by Section 106 of the Jumpstart Our Business Startups Act, U.S. SEC. & EXCH. COMM'N 5 (July 2012), *available at* https://www.sec.gov/news/studies/2012/decimalization-072012.pdf.

[511] Pub. L. No. 112-106, 126 Stat. 306 (2012) (codified in scattered sections of 15 U.S.C.).

[512] Report to Congress on Decimalization, As Required by Section 106 of the Jumpstart Our Business Startups Act, U.S. SEC. & EXCH. COMM'N 19-22 (July 2012), *available at* https://www.sec.gov/news/studies/2012/decimalization-072012.pdf.

[513] SMALL CAP LIQUIDITY REFORM ACT OF 2014, H.R. 3448, 113th Cong. (2014).

[514] Equity Capital Formation Task Force, *From the On-Ramp to the Freeway: Refueling Job Creation and Growth by Reconnecting Investors with Small-Cap Companies* (Nov. 11, 2013), *available at* http://www.securitytraders.org/wp-content/uploads/2013/11/ECF-From-the-On-Ramp-to-the-Freeway-vF.pdf.

the SEC directed the exchanges and FINRA to implement a "Tick Size Pilot Program" that would expand tick sizes for certain small cap stocks in order to determine whether wider tick sizes would enhance market liquidity.[515] Although the Committee has supported the Tick Size Pilot Program in principle, we sent a letter to the SEC in 2014 noting our concerns with the complexity of the pilot program.[516]

A pilot to assess the potential benefits of wider tick sizes is based in part on the argument that wider tick sizes in certain stocks could increase the profitability for market makers dealing in those securities and encourage them to invest in research for those stocks.[517] More research on small cap stocks would increase the availability of information on these stocks and potentially increase demand from fundamental investors. However, there is much skepticism as to whether wider tick sizes would actually result in more investment research.[518] As a separate matter, some experts believe that wider tick sizes could prevent the "quote matching" practices described above.[519] If realized, each of these potential effects could improve liquidity in small cap stocks, and we believe that the success of the plan should be measured by its success at enhancing liquidity in these stocks.

Part IV: Market Data

The Exchange Act requires the SEC to ensure that investors are able to obtain consolidated market data, and that investors are not required to pay unreasonable or unfair fees for such information.[520] The SEC is also committed to

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[515] *See* 79 Fed. Reg. 66423.
[516] *See* Comment Letter from Comm. on Capital Markets Regulation to U.S. SEC. & EXCH. COMM'N, Re: Plan to Implement a Tick Size Pilot Program (Dec. 19, 2014), *available at* http://capmktsreg.org/app/uploads/2014/12/2014-12-19_Tick_Size_Comment.pdf.
[517] *See, e.g.*, Letter to Brent J. Fields from John A. McCarthy, General Counsel of KCG re: Proposed Tick Size Pilot Plan, File No. 4-657 5 (Dec. 19, 2014).
[518] *See generally* Roundtable on Decimalization, U.S. SEC. & EXCH. COMM'N (Feb. 5, 2013), *available at* https://www.sec.gov/news/otherwebcasts/2013/decimalization-transcript-020513.txt.
[519] Scott Kupor and Jeffrey M. Solomon, Equity Co-Chairs of Equity Capital Formation Task Force, Letter to Brent J. Fields, Secretary of SEC, Re: Comments to Plan to Implement a Tick Size Pilot Program (Dec. 18, 2014).
[520] *See generally* 15 U.S.C. § 78k–1 (2012).

ensuring that the trading venues that provide the data do so in an effective and timely manner.[521]

A. Consolidated Market Data

Consolidated market data includes both: (1) pre-trade transparency — timely information on the best-priced public quotations and (2) post-trade transparency — real-time reports of trades as they are executed.[522] Pre-trade transparency serves an essential linkage function by helping to inform the public of the best displayed prices for stocks no matter where they are in the national market system.[523] Post-trade transparency enables investors to monitor the prices at which orders are executed and assess whether their orders received best execution.[524]

The current regulatory structure *requires* that trading venues and broker-dealers have access to consolidated market data. This is because the order protection rule and duty of best execution require that trading venues and broker-dealers seek to ensure that trades are executed at the best publicly displayed prices. Consolidated market data is necessary to make this determination.

1) The Securities Information Processors (SIPs)

Reg NMS requires trading venues to submit publicly displayed quotes and trade executions to securities information processors (**SIPs**).[525] The SIPs aggregate this data from all trading venues and then disseminate the consolidated market data to broker-dealers and trading venues.[526] Importantly, Reg NMS requires that the consolidated data for *each* individual NMS stock be disseminated through a *single*

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[521] *Id. See also* Regulation NMS, Exchange Act Release No. 51808, 70 Fed. Reg. 37496, 37560, 37567 (Jun. 29, 2005), *available at* https://www.sec.gov/rules/final/34-51808fr.pdf.
[522] Concept Release on Equity Market Structure, Exchange Act Release No. 61358, File No. S7-02-10, 75 Fed. Reg. 3594, 3600 (proposed Jan. 21, 2010).
[523] *See id.*
[524] *See id.*
[525] *See* 17 C.F.R. § 242.602.
[526] Regulation NMS, Exchange Act Release No. 51808, 70 Fed. Reg. 37496 (Jun. 29, 2005), *available at* https://www.sec.gov/rules/final/34-51808fr.pdf.

SIP, which can only be established and operated by an SRO.[527] This provision has effectively prohibited competition among SIPs.

In practice, there are three SIPs, each of which disseminates information on a specific subset of stocks. NASDAQ operates one SIP for all NASDAQ-listed stocks and the NYSE operates another SIP for all NYSE-listed stocks.[528] Because companies sometimes choose to list their stocks on other exchanges (e.g., BATS), there is another SIP for these stocks, which the NYSE also operates.[529]

Exchanges charge market participants to access the SIPs. Although the SEC must approve SIP fees, changes to them can be deemed effective when filed with the SEC, leaving market participants with little opportunity for input.[530] SIP revenues are generally not publicly disclosed, and are allocated among exchanges based on their respective market shares of publicly displayed quotes at the NBBO and trade executions.[531] In 2004 and 2008, the SEC did disclose the revenue of the SIPs. In 2004, the consolidated data feed revenues were $393.7 million;[532] in 2008, they were $449.1 million.[533] More recent examples of the significance of these revenues can be determined from public disclosures by NASDAQ and BATS. For example, in 2015 NASDAQ earned approximately $120 million in revenue from the SIPs, while BATS earned approximately $110 million in revenue from the SIPs.[534] NYSE did not disclose its revenues from the SIPs.

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[527] 17 C.F.R. § 242.603(b).
[528] *See* NASDAQ, UTP Vendor Alert #2016 – 1: SIP Launch of Enhanced INET Platform Scheduled for Q4 2016 (Feb. 1, 2016), *available at* http://www.nasdaqtrader.com/TraderNews.aspx?id=utp2016-01; Consolidated Tape Association Overview, *available at* https://www.ctaplan.com/index.
[529] *See* Consolidated Tape Association Overview, *available at* https://www.ctaplan.com/index.
[530] 17 C.F.R. § 242.608(b)(3) (2006).
[531] Regulation NMS, Exchange Act Release No. 51808, 70 Fed. Reg. 37496, 37503 (Jun. 29, 2005), *available at* https://www.sec.gov/rules/final/34-51808fr.pdf.
[532] Regulation NMS, Exchange Act Release No. 51808, 70 Fed. Reg. 37496, 37558 (Jun. 29, 2005), *available at* https://www.sec.gov/rules/final/34-51808fr.pdf.
[533] Concept Release on Equity Market Structure, Exchange Act Release No. 61358, File No. S7-02-10, 75 Fed. Reg. 3594, 3601 (proposed Jan. 21, 2010).
[534] NASDAQ Investor Presentation July 2016, Slide 5, 8, *available at* http://files.shareholder.com/downloads/NDAQ/2440323683x0x809729/A0286863-57CE-476E-BC33-ACA29A5E8143/NDAQInvestorPresentation.pdf; Bats Global Markets, Inc., Prospectus

2) Proprietary Data Feeds

Reg NMS also permits trading venues to sell access to their own private or "proprietary" data feeds.[535] Trading venues and broker-dealers can purchase market data from each trading venue's proprietary data feeds and then consolidate the data themselves in order to obtain consolidated market data. However, we note that in practice trading venues and broker-dealers must still purchase access to the SIPs.

Rule 603(a) of Reg NMS requires all trading venues that sell these proprietary data feeds to make their data feeds available on terms that are fair and reasonable and not discriminatory.[536] However, despite the fact that the SEC requires that trading venues send information to proprietary data feed users at the same time that they send information to the SIPs,[537] the transmission speed of proprietary data is faster than that of the SIP. So, data from these proprietary feeds actually arrive at users faster than SIP data arrives at users.

It is important to note that the SEC has recently increased its efforts to minimize the speed differential between the SIPs and proprietary data feeds and, as a result, the effective difference has been significantly reduced. SIP internal processing latency has declined from nearly 1 second in 2006 to less than half a

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(424B4), 21, 55 (Apr. 15, 2016) (noting that for 2015, approximately 84.0% of BATS' $131 million in market data fees represents their share of tape fees from the U.S. tape plans), *available at* http://www.snl.com/Cache/33875681.pdf.

[535] *See* Regulation NMS, Exchange Act Release No. 51808, 70 Fed. Reg. 37496, 37567 (Jun. 29, 2005), *available at* https://www.sec.gov/rules/final/34-51808fr.pdf.

[536] *See id.* Under Section 11A(c)(1)(c) of the Exchange Act, the more stringent "fair and reasonable" requirement is applicable to an "exclusive processor," which is defined in Section 3(a)(22)(B) of the Exchange Act as an SRO or other entity that distributes the market information of an SRO on an exclusive basis. Rule 603 (a)(1) extends this requirement to non-SRO markets when they act in functionally the same manner as exclusive processor and are the exclusive source of their own data. Applying this requirement to non-SROs is consistent with Section 11A(c)(1)(F) of the Exchange Act, which grants the SEC rulemaking authority to "assure equal regulation of all markets" for NMS Securities.

[537] *Id.*

millisecond as of 2013,[538] and has been reduced even further in the last few years.[539] However, a meaningful difference in speed persists.[540]

B. Criticisms of the Market Data Rules

1) Conflicts of Interest and Underinvestment in SIP Technology

Each SIP is governed by a board of "Plan Participants" comprised entirely of SROs (the exchanges and FINRA).[541] These boards have uniformly awarded contracts for SIP operation to exchanges. We believe that this governance system produces a conflict of interest problem, as exchanges derive significant revenue from their competing proprietary data feeds.[542] This conflict of interest stems from the fact that if the SIPs were just as fast as the proprietary feeds, then market participants could rely solely on the SIPs to access the best priced quotes or most

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[538] *See* Consolidated Tape Association, Notice of Filing and Immediate Effectiveness of the Nineteenth Charges Amendment to the Second Restatement of the CTA Plan and Eleventh Charges Amendment to the Restated CQ Plan, Exchange Act Release No. 70010, 78 FR 44984, 44992 (Jul. 25, 2013) ("Average quote feed latency declined from 800 milliseconds at the end of 2006 to 0.6 milliseconds in April 2013 and average trade feed latency declined from about one second at the end of 2006 to 0.4 milliseconds in April 2013…").

[539] The CTA Plan and UTP Plan SIPs currently maintain latencies of approximately 230 microseconds and 500 microseconds, respectively. *See* https://www.ctaplan.com/index; http://www.utpplan.com/overview; (last accessed Jul. 15, 2016). *See also* Wigglesworth, *infra* note 540 ("Nasdaq also points to investments made in the SIP in recent years that will dramatically increase its speed from about 225 milliseconds a decade ago to 500 microseconds today, and soon to 50 microseconds.").

[540] Robin Wigglesworth et al., *Costly data battle heats up between traders and equity exchanges*, FINANCIAL TIMES (Jul. 5, 2016) ("Because exchanges also sell rival data feeds that are faster and more efficient, critics argue they have starved the SIP of investment. Also, the SIP is slow compared with direct feeds and most brokers feel compelled to pay for an exchange's increasingly expensive pipelines."), *available at* https://next.ft.com/content/785092ec-33d8-11e6-ad39-3fee5ffc5b5b.

[541] *See* Regulation NMS, Exchange Act Release No. 51808, 70 Fed. Reg. 37496, 37592 (Jun. 29, 2005), *available at* https://www.sec.gov/rules/final/34-51808fr.pdf.

[542] For one example of criticism of this practice, *see* IEX Services LLC, SEC Comment Letter, Re: Governance of the NMS Plans Concerning Securities Information Processors and the Consolidated Audit Trail, U.S. SEC. & EXCH. COMM'N (Dec. 10, 2014), *available at* https://www.sec.gov/comments/s7-02-10/s70210-425.pdf.

recent trade execution data.[543] This would likely reduce the demand for proprietary data feeds and the exchange revenue derived from them. Indeed, the exchanges generate a significant portion of their total revenue from their proprietary data feeds. For example, NASDAQ derives almost $200 million in annual revenue from sales of its proprietary data feeds, which represents nearly 10% of NASDAQ's total revenue.[544]

Underinvestment in SIP technology has produced SIPs that are not only slow, but also prone to failure. SIP failures are of particular concern to investors because they can require the shutdown of the entire market. For example, in August 2013, a technical glitch at the NASDAQ SIP caused a three-hour trading halt across all markets in $5 trillion of NASDAQ-listed securities.[545] The NASDAQ SIP server crashed because it did not have enough memory to manage the quotation data stream coming from exchanges.[546]

2) SIPs and the Order Protection Rule

Certain trading venues use the SIP NBBO as part of their "policies and procedures reasonably designed" to comply with the order protection rule,[547] whereas other exchanges use a synthetic NBBO (derived from proprietary market data feeds). For example, NYSE uses the SIP data feeds to determine protected quotations on other venues for purposes of compliance with the order protection

[543] *Id.* at 2; SIFMA, SEC Comment Letter, Re: Recommendations for Equity Market Structure Reforms 8 (Oct. 24, 2014), *available at* https://www.sec.gov/comments/s7-02-10/s70210-422.pdf.

[544] NASDAQ Investor Presentation July 2016, Slide 5, 8, *available at* http://files.shareholder.com/downloads/NDAQ/2440323683x0x809729/A0286863-57CE-476E-BC33-ACA29A5E8143/NDAQInvestorPresentation.pdf.

[545] Michael P. Regan, et al., *Server Crash Spurs 3-Hour NASDAQ Halt as Data Link Lost*, BLOOMBERG (Aug. 26, 2013), *available at* http://www.bloomberg.com/news/articles/2013-08-26/NASDAQ-three-hour-halt-highlights-vulnerability-in-market.

[546] *Id.*

[547] However, because SIP NBBOs include unprotected manual quotes, trading venues using only SIP data feeds must calculate a version of the NBBO that excludes those manual quotes in order to comply with the order protection rule. *See* Notice of Filing of the National Market System Plan Governing the Consolidated Audit Trail, Exchange Act Release No. 77724, Appendix A, Consolidated Audit Trail National Market System Plan Request for Proposal, 25 (Apr. 27, 2016), *available at* https://www.sec.gov/rules/sro/nms/2016/34-77724.pdf.

rule.[548] On the other hand, NASDAQ uses proprietary feeds to determine protected quotations on most other venues.[549]

The speed differential between the SIPs and proprietary data feeds gives rise to the concern that investors may not be getting the best prices for their orders.[550] This is because if an order is executed on a trading venue that relies on the slower SIP NBBO for compliance with the order protection rule, then that trading venue could allow such a trade to occur at a price that is inferior to the best publicly displayed price on another venue (a trade-through). However, if the trading venue used the faster synthetic NBBO, then it would have known of the better priced quotation of another venue and, in compliance with the order protection rule,[551] would have sent the order to the venue with the better price. Thus, because some trading venues use the slower SIP NBBO, investors may not be getting the best available prices for their orders.

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[548] NYSE Rule 19 Supplementary Material .01 *available at* http://nyserules.nyse.com/NYSE/Rules/; Self-Regulatory Organizations; New York Stock Exchange LLC; Notice of Filing and Immediate Effectiveness of Proposed Rule Change Clarifying the Exchange's Use of Certain Data Feeds for Order Handling and Execution, Order Routing, and Regulatory Compliance, Exchange Act Release No. 72710, File No. SR-NYSE-2014-38 4 (Jul. 28, 2014), *available at* http://www.sec.gov/rules/sro/nyse/2014/34-72710.pdf.
[549] NASDAQ Rule 4759 *available at* http://nasdaq.cchwallstreet.com/NASDAQ/Main/.Self-Regulatory Organizations; The NASDAQ Stock Market LLC; Notice of Filing and Immediate Effectiveness of Proposed Rule Change to Disclose Publicly the Sources of Data Used for Exchange Functions, Exchange Act Release No. 72684, File No. SR-NASDAQ-2014-072 4 (Jul. 28, 2014), *available at* http://www.sec.gov/rules/sro/NASDAQ/2014/34-72684.pdf.
[550] *See generally* White, *supra* note 540.
[551] *See* 17 C.F.R. § 242.611 (2015).

Figure 3.7: Exchange Data Feed Use[552]

Exchange	Data Source
BATS Z	Primarily direct feeds
BATS Y	Primarily direct feeds
EDGE A	Primarily direct feeds
EDGE X	Primarily direct feeds
NASDAQ	Primarily direct feeds
NASDAQ BX	Primarily direct feeds
NYSE Arca	Primarily direct feeds
NYSE	SIP only
NYSE MKT	SIP only

C. How to Reform the Market Data Rules

1) Step 1: Improve SIP Transparency

As a first step to reform this system, we recommend that the SEC implement rules to raise the bar on SIP governance. The SEC should require that SROs each publicly disclose their revenues earned from (1) proprietary data feeds and (2) operating the SIPs. The disclosures should also include data regarding the relative performance of proprietary data feeds and the SIP. In particular, the disclosures would contain information regarding the processing speeds of the proprietary data feeds and the SIP, which directly impact when end users receive market data. As

[552] *See* BATS BZX Exchange Rule 11.26, *available at* http://cdn.batstrading.com/resources/regulation/rule_book/BATS_Exchange_Rulebook.pdf (BATS Z); BATS BYX Exchange Rule 11.26, *available at* http://cdn.batstrading.com/resources/regulation/rule_book/BYX_Rulebook.pdf (BATS Y); BATS EDGA Exchange Rule 13.4, *available at* http://cdn.batstrading.com/resources/regulation/rule_book/EDGA_Rulebook.pdf (EDGE A); BATS EDGX Exchange Rule 13.4, *available at* http://cdn.batstrading.com/resources/regulation/rule_book/EDGX_Rulebook.pdf (EDGE X); NASDAQ Rule 4759, *available at* http://nasdaq.cchwallstreet.com/NASDAQ/Main/ (NASDAQ); NASDAQ BX Rule 4759, *available at* http://nasdaqomxbx.cchwallstreet.com/NASDAQOMXBX/Main/ (NASDAQ BX); NYSE Arca Rule 7.37P, *available at* http://wallstreet.cch.com/PCX/PCXE/ (NYSE Arca); NYSE Rule 19 Supplementary Material .01, *available at* http://nyserules.nyse.com/NYSE/Rules/ (NYSE); NYSE MKT Rule 19 Supplementary Material .01, *available at* http://wallstreet.cch.com/MKT/Rules/ (NYSE MKT). Last accessed Jul. 15, 2016.

further explained above, latency is a crucial execution quality metric that impacts, inter alia, the price at which trades are executed relative to the prevailing NBBO. Disclosures regarding processing speed would therefore provide a key piece of quantifiable data that could be used to objectively evaluate the performance of SIPs vis-à-vis proprietary feeds. Making this information publicly available would not only increase transparency, but would immediately force the SROs to accept greater accountability for any SIP deficiencies.

Specific Recommendations:

18. The SEC should require exchanges to publicly disclose revenues from the SIPs, the allocation of market data revenues among SIP Plan Participants and revenues from proprietary data feeds.

19. The SEC should require exchanges to disclose performance data for the SIPs and proprietary data feeds to facilitate a comparison of the relative speeds with which investors can obtain actionable market data from each.

2) Step 2: Allow Competition Between Multiple SIPs

The vigorous competition encouraged by other aspects of Reg NMS has produced innumerable benefits for investors.[553] Ultimately, subjecting SIPs to the same competitive forces would likely produce similar results. However, when it adopted Reg NMS, the SEC expressly rejected a competing SIPs model, citing concerns that competition would not reduce costs for data consumers but would erode the benefits of a single point of reference.[554] The SEC noted that even if there were multiple SIPs, market participants would still need to purchase a data feed from each exchange to determine the NBBO, and this would leave "little room" for price competition.[555] However, the single SIP structure has failed to produce its anticipated benefits and has also demonstrably created new concerns

[553] *See, e.g.*, Aguilar, *supra* note 474.
[554] *See* Regulation NMS, Exchange Act Release No. 51808, 70 Fed. Reg. 37496, 37559 (Jun. 29, 2005), *available at* https://www.sec.gov/rules/final/34-51808fr.pdf.
[555] *Id.*

and costs for the markets. We believe that allowing competition between SIPs would address these new concerns that we describe below.

First, we believe that subjecting SIPs to competition will narrow their performance gap with private data feeds. Speed is a crucial metric of performance for data consolidators, so a significantly slower SIP would not be able to survive under competitive pressure. This change would level the playing field between investors who rely on the SIPs with those who also use proprietary data feeds.

Second, the current model establishes the SIPs as single points of failure where technological glitches can disrupt trading for all market participants. Introducing competition to the SIP structure would force SIP operators to invest more in developing SIP technology. Competition could therefore encourage improvements in resiliency. Moreover, the availability of alternative sources of consolidated data would likely prevent market-wide paralysis in the event that one SIP fails.[556]

Third, the existing SIP structure compromises the effectiveness of the order protection rule and broker-dealers' duty of best execution (for those broker-dealers relying on slower SIP data). Introducing competition would likely ameliorate this problem by encouraging improvements in SIP speed. Faster SIPs would likely mean that trading venues that rely on the SIP NBBO would allow for fewer trade-throughs. It would also improve routing strategies for broker-dealers that rely on the SIPs when routing orders. This is because there should be fewer differences between the quotations included in the SIP NBBO and synthetic NBBOs as the speed differential decreases.

Finally, competition among multiple SIPs could also substantially reduce the total cost of market data. Today, many broker-dealers are effectively required to purchase access to proprietary data feeds *and* the SIP, even though both provide

[556] *See* Corporate Stock Trading Volume, Spreads and Depth Before, During and After the NYSE Trading Suspension on July 8, 2015, Data Highlight 2016-01, U.S. SEC. & EXCH. COMM'N (Feb. 3, 2016), *available at* https://www.sec.gov/marketstructure/research/highlight-2016-01.html.

highly similar data.[557] If competition improved the speed of the SIPs, then broker-dealers could potentially avoid having to pay for proprietary data feeds in addition to the SIP.

a) *Implementing a Competing Consolidators Structure*

Competition among SIPs should be implemented through a progressive series of reforms. First, the SEC should eliminate the Reg NMS provisions that allow only SROs to create and operate SIPs,[558] opening up a so-called competing consolidator model. Eligibility to create and operate a SIP should depend on compliance with established functional and operational standards, not a formalistic, entity-based classification. An entity-based restriction unnecessarily limits the number of potential SIP operators. Opening up operator eligibility also drives innovation by introducing a greater diversity of strategies and technologies tailored towards this issue.

Second, the SEC should enact reforms to improve the minimum performance of the current SIPs. The SEC could establish latency caps and mandatory resiliency mechanisms at each SIP. Requiring SIPs to meet objective data quality metrics, such as a minimum speed threshold, would ensure the achievement of a performance baseline. Establishing resiliency standards and related risk control requirements would facilitate the smooth functioning of the markets regardless of technological hiccups and would promote investor confidence. The existence of SIP competitors would then provide an incentive to exceed these standards.

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[557] *See* Wigglesworth, *supra* note 540. *See also infra* Chapter 4, Part IV.
[558] *See, e.g.*, 17 C.F.R. § 242.603(b); 17 C.F.R. § 242.600(b)(55). *See also* 15 U.S.C. § 78c(a)(22)(B).

Specific Recommendations:

20. After requiring disclosure of exchange market data revenues, the SEC should adopt a "Competing Consolidator" model for data dissemination. As a first step to implementing this framework, the SEC should promote reforms in the governance and transparency of the current SIPs.

CHAPTER 4: UNDERSTANDING AND ENHANCING MARKET RESILIENCY

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CHAPTER 4: UNDERSTANDING AND ENHANCING MARKET RESILIENCY

*Part I of this Chapter explains the 2010 flash crash (the **"Flash Crash"**), the market break of 1987 and the market-wide disruptions experienced on August 24, 2015. Part II of this Chapter describes the existing volatility controls and sets forth specific recommendations for how to strengthen the resiliency of our equity markets.*

Part I: Examining Incidences of Extreme Volatility in U.S. Equity Markets

A. The 2010 Flash Crash

On May 6, 2010 E-mini S&P 500 futures dropped 5.1% over a period of 13 minutes, before rebounding 6.4% over the next 23 minutes.[559] The E-mini S&P 500 derives its value from the components of the S&P 500 and contributes substantially to price discovery in S&P 500 stocks. Therefore, the futures market dislocation was rapidly transmitted to cash equity markets and the decline in the S&P 500 index mirrored the E-mini decline in almost real time.[560] To put these losses into context, $1 trillion in stock market value disappeared in just 13 minutes during the Flash Crash.[561]

According to a joint report by the SEC and CFTC regarding the events of May 6, 2010 (the **"Joint Report"**), the price crash was likely triggered by a mutual fund executing an algorithmic trade for a series of unusually large and aggressive

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[559] Andrei Kirilenko et al., *The Flash Crash: The Impact of High Frequency Trading on an Electronic Market*, 5-6 (2014), *available at* http://www.cftc.gov/idc/groups/public/@economicanalysis/documents/file/oce_flashcrash0314.pdf.

[560] *Id.* at 36.

[561] Aruna Viswanatha et al., *'Flash Crash' Charges Filed*, WALL ST. J. (Apr. 21, 2015), *available at* http://www.wsj.com/articles/u-k-man-arrested-on-charges-tied-to-may-2010-flash-crash-1429636758.

sell orders. The sell order was for 75,000 E-Mini contracts (valued at $4.1 billion).[562]

The Joint Report also describes the role of HFT market makers in the Flash Crash.[563] In this context, the term "market maker" describes a trading strategy, rather than a formal registration requirement.[564] Importantly, these strategies often involve trading large gross volumes to achieve small changes in net position. For example, these strategies might involve buying 10 contracts and selling 11 contracts in order to reduce net exposure by 1 contract. According to the Joint Report, HFT market makers played a game of "hot potato" as they reduced their inventory, rapidly exchanging large numbers of contracts to effect small changes in net position.[565] Unfortunately, the mutual fund's algorithm was designed to enter increasingly aggressive sell orders as trading volume increased. As a result, a *negative feedback loop* developed, whereby the trading strategies of HFT market makers caused the mutual fund's algorithm to enter even more aggressive sell orders, further driving down stock prices.[566]

The sharp and sudden drop in individual stock prices left many HFT market makers unsure about the financial risk that they were taking by continuing to trade in these stocks, so they either widened spreads or stopped offering buy-side liquidity.[567] HFT market makers also began entering "stub quotes."[568] Stub quotes are bids and offers that are so far from the current market prices that they are clearly not intended to be executed, but are posted merely to satisfy a market maker's obligation (as explained below).[569] However, due to the rapid withdrawal of liquidity, the stub quotes became the best price available in certain stocks and

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[562] Findings Regarding the Market Events of May 6, 2010, Report of the Staffs of the CFTC and SEC to the Joint Advisory Committee on Emerging Regulatory Issues 2 (Sept. 30, 2010), *available at* https://www.sec.gov/news/studies/2010/marketevents-report.pdf.
[563] *Id.* at 3.
[564] *Id.* at 13.
[565] *Id.* at 3.
[566] *Id.* at 3.
[567] *Id.* at 5, 64.
[568] *Id.* at 5, 38.
[569] *Id.* at 63.

orders were executed against stub quotes at unrealistically low prices.[570] One such stock was Accenture, which briefly traded for $0.01 before rebounding to close at $41.09; the drop from $30 to $0.01 occurred in a 7-second span.[571]

Additionally, broker-dealer internalizers and ATSs responded to the market uncertainty by routing customer orders to exchanges rather than executing them.[572] Indeed, ADF/TRF volume, which represents trades executed by internalizers and ATSs, dropped from approximately 25-30% to around 11% during the crash.[573]

The selling pressure continued until the prices in the E-mini contracts had fallen far enough to trigger a 5-second trading halt at the Chicago Mercantile Exchange (a futures exchange).[574] After this trading halt, market participants slowly stepped in to purchase contracts and the price of the E-mini and the related stocks largely rebounded. In the end, May 6 was characterized by price swings in a number of securities that were both rapid and severe. Between 2:40pm and 3:00pm that day, more than 20,000 trades in over 300 securities were executed at prices 60% or further from their price before that timeframe.[575] However, the effects of the volatility during the Flash Crash were generally limited to these 300 securities. More than 98% of the total U.S. trading volume in that time period received executions at prices within 10% of their 2:40pm price.[576] As a result, market-wide circuit breakers that would shut down trading in all stocks were not triggered.

Due to events like the Flash Crash, there is concern that the added liquidity provided by market makers in today's market structure is illusory because during volatile market conditions market makers will withdraw from the market, thereby exacerbating rather than relieving market stress. We reviewed the relevant academic literature on this issue in Chapter 1.

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[570] *Id.* at 5.
[571] *Id.* at 83.
[572] *Id.* at 5, 58, 65.
[573] *Id.* at 58-62.
[574] *Id.* at 12, 15.
[575] *Id.* at 6.
[576] *Id.* at 5.

To further evaluate these concerns we examine the rules that applied to market makers in manual markets and compare them to the rules that apply to market makers in today's automated markets. We identify the key differences between these requirements and explain the policy rationale for these rule changes. Finally, we compare the performance of market makers during the Flash Crash with the performance of market makers during the market break of 1987. We find that, despite differences between the rules applicable to market makers, the actions of market makers in each crash were similar in certain respects.

B. Automated Market Makers and Manual Market Makers

The Exchange Act does not require that an exchange have designated market makers to provide liquidity for stocks. However, Exchange Act Rule 11b-1 established by the SEC in 1964 provides that national securities exchanges may establish rules for members of an exchange to register as "specialists."[577] Those rules require that a member registered as a specialist must "engage in a course of dealings for his own account to assist in the maintenance, so far as practicable, of a fair and orderly market."[578] Until 2008, the NYSE designated one specialist for each NYSE stock who acted as a market maker for that stock and through whom substantially all activity for that security was routed.[579] In 2008, the NYSE eliminated specialists and replaced them with designated market makers (**"DMMs"**).[580] After NASDAQ became a national securities exchange in 2006,

[577] 17 C.F.R. § 240.11b-1(a).
[578] 17 C.F.R. § 240.11b-1(a)(2)(ii).
[579] Self-Regulatory Organizations; New York Stock Exchange, LLC; Notice of Filing of Amendments Nos. 2 and 3 and Order Granting Accelerated Approval to a Proposed Rule Change, as Modified by Amendment Nos. 1, 2, and 3, to create a New NYSE Market Model, with certain Components to Operate as a One-Year Pilot, That Would Alter NYSE's Priority and Parity Rules, Phase Out Specialists by Creating a Designated Market Maker, and Provide Market Participants with Additional Abilities to Post Hidden Liquidity, Exchange Act Release No. 58845, 13 (Oct. 24, 2008), *available at* https://www.sec.gov/rules/sro/nyse/2008/34-58845.pdf [hereinafter 2008 SEC Release].
[580] *See generally* 2008 SEC Release; Self-Regulatory Organizations; New York Stock Exchange, LLC; Order Granting Approval of a Proposed Rule Change Making Permanent Rules of the NYSE New Market Model Pilot and the NYSE Supplemental Liquidity Providers Pilot, Exchange Act Release No. 75578 (Jul. 31, 2015), *available at* https://www.sec.gov/rules/sro/nyse/2015/34-75578.pdf [hereinafter 2015 SEC Release].

NASDAQ adopted similar rules for the registration of what it calls "NASDAQ Market Makers" (**"NMMs"**).[581]

Below we described the obligations applicable to NYSE and NASDAQ designated market makers and we compare them with the obligations that applied to NYSE specialists. We also explain why the SEC effectively eliminated the role of specialists in favor of the designated market maker.

1) NYSE and NASDAQ Designated Market Makers

The NYSE allows its broker-dealer members to seek registration as DMMs if they file an application and meet the NYSE's capital requirements, among other considerations.[582] However, only one DMM is assigned to each issuer listed on the NYSE. Generally, an issuer selects its DMM through an interview process prior to its initial public offering and can change DMMs at its discretion.[583] Today, there are only six DMMs on the NYSE.[584]

The NYSE requires that DMMs "engage in a course of dealings for their own account to assist in the maintenance of a fair and orderly market insofar as reasonably practicable."[585] The NYSE rules state that this obligation "implies the maintenance of price continuity with reasonable depth . . . and the minimizing of the effects of a temporary disparity between supply and demand."[586] NYSE rules further state that "when lack of price continuity, lack of depth, or disparity between supply and demand exists or is reasonably to be anticipated," then "it is commonly desirable" that the DMM act under its own account to maintain a fair and orderly market.[587]

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[581] *See generally* In the Matter of the Application of the Nasdaq Stock Market LLC for Registration as a National Securities Exchange, Exchange Act Release No. 53128 (Jan. 13, 2006).
[582] NYSE Rule 103(a)(i).
[583] NYSE Rule 103B(I), (III), (IV).
[584] NYSE, *NYSE Membership*, https://www.nyse.com/markets/nyse/membership (last visited Jul. 18, 2016).
[585] NYSE Rule 104(a).
[586] NYSE Rule 104(f)(ii).
[587] *Id.*

The NYSE rules also impose explicit affirmative duties on DMMs to maintain a fair and orderly market. First, the DMM must provide "liquidity as needed to provide a reasonable quotation" and maintain "a continuous two-sided quote with a displayed size of at least one round lot, generally 100 shares."[588] To satisfy this first obligation, the DMM must maintain a bid or offer at the NBBO for at least 10% of the trading day for securities for which it is the DMM that have a consolidated average daily volume of one million or more shares.[589] Second, at the time of entry of its bid or offer, the price of the bid or offer shall generally not be more than between 8% and 30% away from the then current NBBO.[590] These responsibilities are also intended to facilitate the opening and closing of trading for each security.[591] Other than during the market open and close, the NYSE rules generally do not prohibit a DMM from trading for its own account.[592]

The NASDAQ rules for NMMs are similar. An NMM must be a broker-dealer member registered with NASDAQ and must satisfy certain minimum requirements, as determined by NASDAQ.[593] Unlike DMMs, however, there is more than one NMM for a given security. That is because once registered as an NMM, the NMM may register as an NMM for any or all issuers. The registration for a specific issuer becomes effective the day the NMM makes the registration request.[594] Indeed, there are over 300 NMMs in total and an average of 14 NMMs for each stock listed on NASDAQ.[595]

Like the NYSE DMM, an NMM has an affirmative obligation to "engage in a course of dealings for its own account to assist in the maintenance, in so far as

[588] NYSE Rule 104(a)(1); NYSE Rule 55.
[589] NYSE Rule 104(a)(1)(A).
[590] NYSE Rule 104(a)(1)(B).
[591] NYSE Rule 104(a)(2), (3).
[592] NYSE Rule 104(g)(i).
[593] NASDAQ Rule 4611, 4612.
[594] NASDAQ Rule 4612(b).
[595] NASDAQ, About NASDAQ 46, http://www.nasdaq.com/about/about.pdf (last visited Jul. 15, 2016).

reasonably practicable, of fair and orderly markets."[596] NASDAQ rules impose two explicit affirmative obligations to satisfy that requirement. First, "[f]or each security in which a member is registered as a [NMM], the member shall be willing to buy and sell such security for its own account on a continuous basis during regular market hours and shall enter and maintain a two-sided trading interest . . . that is identified to the [NASDAQ] as the interest meeting the obligation and is displayed in the [NASDAQ's] quotation montage at all times."[597] The NMM's bid or offer must be for at least 100 shares of stock.[598] Second, an NMM's bid or offer must meet certain pricing requirements. Specifically, at the time of entry of a bid or offer of interest, the price of the bid or offer must generally not be more than 8% to 30% away from the then current NBBO.[599]

a) *NYSE Specialists*

Until replaced in 2008, Rule 104.10 of the NYSE rules for specialists stated that "the function of a member acting as regular specialist on the Floor of the Exchange includes, in addition to the effective execution of commission orders entrusted to him, the maintenance insofar as reasonably practicable, of a fair and orderly market."[600] This requirement was similar to the overarching obligation DMMs have today, although the rules for specialists did not prescribe the percentage of the trading day for which a specialist needed to maintain a bid or an offer for their stock or impose restrictions regarding the disparity between a specialist's bid or offer and the NBBO.

However, NYSE rules did set forth important restrictions on a specialist's ability to trade for his or her own account in a security for which he was a specialist. First, specialists could not trade for their own accounts "unless such

[596] NASDAQ Rule 4613.
[597] NASDAQ Rule 4613(a)(1).
[598] *Id.*
[599] NASDAQ Rule 4613(a)(2).
[600] Nicholas Wolfson & Thomas A. Russo, *The Stock Exchange Member: Liability for Violation of Stock Exchange Rules*, 58 CALIF. L. REV. 1120, 1144 n.113 (1970) (citing NYSE Rule 104.10 as then in effect).

dealings [were] reasonably necessary" to maintain a fair and orderly market.[601] Exchange Act Rule 11b-1 required the NYSE to impose that rule on specialists and it was known as the "negative obligation."[602] Second, specialists were generally required by NYSE rules to trade against the trend of the market. For example, if the price of a specialist's stock was trending upwards, then the specialist could not purchase shares at a price higher than the last completed trade to increase its long position.[603] However, while specialists were expected to dampen *abrupt* price movements, they were not obligated to curb a general movement in prices in one direction.[604]

Importantly, DMMs are not required to satisfy either of the abovementioned NYSE rules. Therefore, the primary differences between NYSE specialists and DMMs are that: (1) DMMs are generally allowed to trade for their own account, whereas specialists were subject to the negative obligation that restricted such trading; and (2) DMMs are not required to trade against the market trend, whereas specialists were required to trade against the market.

The SEC orders approving the NYSE's reforms to eliminate specialists and create DMMs indicate that the SEC allowed these changes primarily due to the practical differences between market making in manual markets and automated markets.[605]

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[601] Self-Regulatory Organizations; New York Stock Exchange LLC; Notice of Filing and Order Granting Accelerated Approval to Proposed Rule Change, as Amended, Relating to Exchange Rule 104.10 ("Dealings by Specialists"), Exchange Act Release No. 54860 at 2 (Dec. 1, 2006), *available at* https://www.sec.gov/rules/sro/nyse/2006/34-54860.pdf [hereinafter 2006 SEC Release] (citing NYSE Rule 104 as then in effect).
[602] Rule 11b-1(a)(2)(iii).
[603] 2006 SEC Release at 3.
[604] *The October 1987 Market Break*, U.S. SEC. & EXCH. COMM'N 4-3 (1988) ("The specialists' responsibilities to trade do not require them to stem general downward or upward price movements, but only to temper sudden price movements and keep any general price movements orderly.").
[605] *See* 2006 SEC Release at 16-18, 30, 33-37; 2008 SEC Release at 37-38; 2015 SEC Release at 1-3, 22-24.

First, according to the SEC's 2008 order, automated markets enabled other market participants to compete with specialists over market making.[606] This is because in electronic markets specialists did not have the informational advantage that they had in a floor-based market where the specialist was at the center of substantially all of the exchange's activity for a specific security.[607] In an automated marketplace, competitors to specialists now had access to the same market information as the specialists and were not subject to the "negative obligation." The negative obligation would therefore put specialists at a competitive advantage to their competitors.[608]

Second, in a high-speed automated trading system it would be difficult for a specialist to accurately track price movements for every trade.[609] If specialists could not track price movements for every trade, then they would be at risk of inadvertently violating the NYSE rule that they always trade against the market trend. Therefore, in light of the automation of the marketplace, the SEC concluded it was appropriate for the NYSE to move to a DMM model that did not impose the same restrictions specialists endured as to when and at what price a market maker could trade for its own account.[610]

An analysis of the actions of specialists during a price crash in the manual markets is informative as to whether the rules applicable to specialists prevented market makers from exiting markets, as market makers did in the 2010 Flash Crash. We explore the actions of NYSE specialists during the 1987 market break below.

C. The 1987 Market Break

Between Tuesday October 13, 1987 and "Black Monday" October 19, 1987, the market value of U.S. equities fell approximately $1 trillion, representing more

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[606] *See* 2008 SEC Release at 36-37.
[607] *Id.* at 13.
[608] *Id.* at 18-19.
[609] *Id.* at 16.
[610] *See* 2006 SEC Release at 16-18, 30, 33-37; 2008 SEC Release at 13; *see generally* 2015 SEC Release.

than 20% of GDP that year.[611] The disruption continued through "Terrible Tuesday," when trading halted in 175 stocks and S&P 500 futures declined 25% over a period of several hours before quickly rebounding.[612]

Efforts by NYSE specialists to preserve price stability during this period varied markedly. As a group, specialists aggressively countered the downward trend for the first hour of trading on Black Monday,[613] but by the end of the day, 13 of 55 NYSE specialists had exhausted their buying power by hitting capital constraints.[614] A sample of specialists for 50 large cap stocks found that 30% of specialists ended the day as net sellers,[615] while an additional 10% ended the day with a net short position.[616] Indeed, on Terrible Tuesday, 82% of specialists were net sellers.[617] According to a report by the Presidential Task Force on Market Mechanisms, many specialists simply refused to "sacrifice large amounts of capital in what must have seemed like a hopeless attempt to stem overwhelming waves of selling pressure."[618] The SEC report on the 1987 market break, characterized NYSE specialist performance on Terrible Tuesday as "uniformly weak and reflective of the panic and exhaustion prevalent on the NYSE floor."[619]

Ultimately, specialists were unwilling or unable to meaningfully effect price stability during the chaos. With a combined total of roughly $1 billion in capital, NYSE specialists may have been powerless to impact prices when volumes reached $15-$25 billion.[620] The SEC recommended that the NYSE evaluate whether specialists made adequate efforts to ensure continuity and depth and

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[611] Nicholas F. Brady et al., *Report of the Presidential Task Force on Market Mechanisms*, WASHINGTON: GOVERNMENT PRINTING OFFICE (Jan. 1988), *available at* https://ia802605.us.archive.org/0/items/reportofpresiden01unit/reportofpresiden01unit.pdf.
[612] *Id.* at 37, 45.
[613] *Id.* at 49.
[614] *The October 1987 Market Break*, U.S. SEC. & EXCH. COMM'N 4-2 (1988).
[615] Brady et al., *supra* note 611, at 49.
[616] *Id.*
[617] *Id.*
[618] *Id.* at 50.
[619] *The October 1987 Market Break*, U.S. SEC. & EXCH. COMM'N 4-27 (1988).
[620] *See* U.S. Congress, Office of Technology Assessment, *Electronic Bulls and Bears: U.S. Securities Markets and Information Technology* 59-60 (Sept. 1990), *available at* https://www.princeton.edu/~ota/disk2/1990/9015/9015.PDF.

suggested that the NYSE reallocate stocks to other specialists if necessary.[621] The following year, NYSE punished poor performing specialists by reallocating 11 stocks from 7 specialist groups.[622]

We believe that HFT market makers during the Flash Crash exhibited notable similarities to their specialist counterparts during the 1987 market break. Most importantly, they purchased aggressively when declines began,[623] but were "overwhelmed by a very large liquidity imbalance" that continued to develop.[624] They also widened spreads and reduced depth when the large price drop triggered self-imposed limits.[625] Therefore, at this time we do not make any specific recommendations to change the rules applicable to market makers, as we do not believe the Flash Crash provides clear support for such changes.

D. Market Events of August 24, 2015

On August 24, 2015, concerns about the health of the Chinese economy led to a dramatic (8.5%) overnight decline in the Shanghai Composite Index in China, setting the stage for a shaky open to the U.S. stock market.[626] That morning, U.S. equity markets experienced delayed openings, severe price dislocations, extreme

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[621] *The October 1987 Market Break*, U.S. SEC. & EXCH. COMM'N 4-28 (1988).

[622] *See* Robert A. Schwartz, *Reshaping the Equity Markets: A Guide for the 1990s* (1993); *See* U.S. Congress, Office of Technology Assessment, *Electronic Bulls and Bears: U.S. Securities Markets and Information Technology* 59-60 (Sept. 1990), *available at* https://www.princeton.edu/~ota/disk2/1990/9015/9015.PDF.

[623] Findings Regarding the Market Events of May 6, 2010, Report of the Staffs of the CFTC and SEC to the Joint Advisory Committee on Emerging Regulatory Issues 1-6 (Sept. 30, 2010), *available at* https://www.sec.gov/news/studies/2010/marketevents-report.pdf.

[624] Andrei A. Kirilenko et al., *The Flash Crash: The Impact of High Frequency Trading on an Electronic Market* 14 (Dec. 28, 2015), *available at* http://www.cftc.gov/idc/groups/public/@economicanalysis/documents/file/oce_flashcrash0314.pdf.

[625] Findings Regarding the Market Events of May 6, 2010, Report of the Staffs of the CFTC and SEC to the Joint Advisory Committee on Emerging Regulatory Issues 38 (Sept. 30, 2010), *available at* https://www.sec.gov/news/studies/2010/marketevents-report.pdf.

[626] *Strengthening U.S. Equity Market Structure to Better Address Extreme Volatility*, N.Y. STOCK EXCH. 36 (Jan. 28, 2016), *available at* https://www.nyse.com/publicdocs/Strengthening_US_equity_market_structure.pdf; Mark Thompson &Charles Riley, *World markets plunge as China stocks crash*, CNN (Aug. 24, 2015), *available at* http://money.cnn.com/2015/08/23/investing/world-stock-markets/.

volatility, and an uneven and unusual level of trading halts. The S&P 500 index fell more than 5% within the first five minutes of the market open.[627] Nearly half of NYSE-listed stocks had not yet opened ten minutes into the trading day and stocks that had opened on time were trading at extreme price levels.[628] For example, blue chip stocks including General Electric, Ford, and JP Morgan experienced price declines of more than 20%.[629] In addition to the overall market decline, an abnormally high number of trading halts were imposed on 471 individual stocks with nearly 1,300 halts occurring throughout the trading day.[630]

Turmoil in the stock market also caused disruptions in the exchange-traded fund (**"ETF"**) market. ETF market makers generally provide quotes for an ETF based on the prices of an ETFs' underlying securities.[631] For example, the iShares Core S&P 500 ETF (ticker: IVV) tracks the performance of the S&P 500 index.[632] ETF market makers provide efficient quotes for IVV largely based on the aggregated market prices of the individual stocks that make up the S&P 500. However, without reliable prices for the individual S&P 500 stocks (due to trading halts), pricing the IVV ETF becomes much more difficult and risky. Accordingly, market makers were reluctant to supply liquidity for ETFs on August 24, because they did not have access to reliable price information for the underlying securities that they use to price the ETFs.[633] In addition, trading halts undermined market makers' confidence that they could reliably execute trades in the individual stocks, making it difficult to continue to provide liquidity in the associated ETFs. At one point, the price of the IVV ETF declined 20%, even though the S&P 500 index that

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[627] Emma O'Brien et al., *S&P 500 Pulls Back From Correction While Risk-Asset Rout Deepens*, BLOOMBERG (Aug. 24, 2015), *available at* http://www.financial-planning.com/news/s-p-500-pulls-back-from-correction-while-risk-asset-rout-deepens.
[628] *See US Equity Market Structure: Lessons from August 24*, BLACKROCK 7 (Oct. 2015), *available at* https://www.blackrock.com/corporate/en-us/literature/whitepaper/viewpoint-us-equity-market-structure-october-2015.pdf.
[629] *Id.*
[630] *Id.*
[631] *Id.*
[632] *See* iShares Core S&P 500 ETF Overview, *available at* https://www.ishares.com/us/products/239726/ishares-core-sp-500-etf.
[633] *See* BLACKROCK, *supra* note 628, at 7.

it tracked never fell more than 7%.[634] Roughly 20% of ETFs listed in the U.S. were subject to trading halts throughout the day.[635]

We believe that the SEC should pursue reforms that would support the efficient pricing of ETFs in the face of trading halts of the underlying securities. The NYSE has suggested that the SEC consider aligning trading halt procedures between individual equities and ETFs.[636] While we do not have a specific recommendation at this time, we tentatively agree that the SEC should consider rules that would halt the trading of an ETF if a sufficiently high percentage of its underlying securities are subject to a trading halt. Subjecting an ETF to a trading halt is likely better than allowing an ETF to dramatically fall in value simply because market makers are unable to provide liquidity.

Part II: Enhancing Volatility Controls

A. Market-wide Circuit Breakers

Market-wide circuit breakers are designed to briefly shut down trading in all stocks across all trading venues to promote the orderly functioning of markets. Shutting down trading promotes the orderly functioning of markets, because it provides market participants with additional time to assess new information and significant changes in market prices and to adjust automated trading systems that may be executing trades at unintended prices. This can reduce the market impact of abrupt price movements.[637]

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[634] SEC Division of Trading and Markets, Research Note: Equity Markets Volatility on August 24, 2015, U.S. SEC. & EXCH. COMM'N (Dec. 2015), *available at* https://www.sec.gov/marketstructure/research/equity_market_volatility.pdf.
[635] *Id.*
[636] *See* N.Y. STOCK EXCH., *supra* note 626.
[637] Findings Regarding the Market Events of May 6, 2010, Report of the Staffs of the CFTC and SEC to the Joint Advisory Committee on Emerging Regulatory Issues 7 (Sept. 30, 2010), *available at* https://www.sec.gov/news/studies/2010/marketevents-report.pdf.

Market-wide circuit breakers existed before the Flash Crash and were tied to single-day declines in the Dow Jones Industrial Average.[638] The thresholds at which the original circuit breakers would be activated were price declines of 10%, 20%, and 30%.[639] However, the market-wide volatility during the Flash Crash did not exceed the lowest threshold. This is because the crash was limited to 300 different securities and so a sufficient decline in the Dow Jones did not take place that day.[640] The SEC responded to the Flash Crash by lowering the thresholds at which the market-wide circuit breakers are triggered[641] to price declines of 7%, 13%, and 20%.[642] In addition, the SEC now uses the S&P 500 as the reference index instead of the Dow Jones.[643]

Despite the lower threshold, the market-wide circuit breaker was not triggered during the more recent August 24, 2015 market disruption, even though nearly 1,300 trading halts occurred throughout the day. In fact, the market-wide circuit breakers that were established after the Flash Crash have never been triggered and would only have been triggered 12 times since 1980.[644] According to the SEC, a primary reason that the market-wide circuit breakers were not triggered on August 24 was that many components of the S&P 500 did not open on time, so the prices of those components were not accurately reflected in the reference index.[645] If all NYSE-listed stocks had opened promptly, then the S&P 500 index would

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[638] *See* Mark Koba, *Market Circuit Breakers: CNBC Explains*, CNBC (Aug. 10, 2011), *available at* http://www.cnbc.com/id/44059883.
[639] *Id.*
[640] Findings Regarding the Market Events of May 6, 2010, Report of the Staffs of the CFTC and SEC to the Joint Advisory Committee on Emerging Regulatory Issues 6 (Sept. 30, 2010), *available at* https://www.sec.gov/news/studies/2010/marketevents-report.pdf.
[641] Self-Regulatory Organizations; Notice of Filing of Amendments No. 1 and Order Granting Accelerated Approval of Proposed Rule Changes as Modified by Amendments No. 1, Relating to Trading Halts Due to Extraordinary Market Volatility, Exchange Act Release No. 67090 (May 31, 2012), *available at* http://www.sec.gov/rules/sro/bats/2012/34-67090.pdf.
[642] *Id.* at 4, 5.
[643] *Id.*
[644] *See* BLACKROCK, *supra* note 628, at 7.
[645] *See* SEC Division of Trading and Markets, Research Note: Equity Markets Volatility on August 24, 2015, U.S. SEC. & EXCH. COMM'N 16 (Dec. 2015), *available at* https://www.sec.gov/marketstructure/research/equity_market_volatility.pdf.

have reflected the actual market decline and the market-wide circuit breakers would have been triggered.[646]

Certain market experts believe that a market-wide circuit breaker would have been a better mechanism for market stabilization on August 24, instead of multiple individual trading halts.[647] Indeed, widespread individual trading halts may have actually fueled the instability. Trading halts were applied over a thousand times, but were not implemented uniformly or simultaneously. As a result, market participants were uncertain as to whether their trades would be completed. Additionally, reopening trading in a halted stock was highly problematic.[648]

Of course, in order to achieve the mechanism's market stabilizing purpose, a market-wide circuit breaker requires a trigger threshold that is actually activated during times of severe disruption. One potential approach to implementing more effective circuit breakers would be to further lower the threshold decline in the reference index that triggers the circuit breakers. However, lowering the trigger to a percent variation less than the current 7% threshold could make the circuit breakers too sensitive to price fluctuations in the S&P 500. Hyperactive circuit breakers could produce unnecessary disruptions in trading activity or enhance negative market sentiments founded on the perception of widespread volatility.

Indeed, the failed implementation of a market-wide circuit breaker in China provides a cautionary tale. The Shanghai and Shenzhen Stock Exchanges implemented a circuit breaker in January 2016 that suspended trading for 15 minutes when the market index fell by 5 percent and halted trading for the rest of the day after a fall of 7 percent.[649] On the inaugural day of the circuit breaker, a 5-percent 15-minute suspension was triggered less than four hours into the trading

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[646] *Id.*
[647] *See* BLACKROCK, *supra* note 628, at 7.
[648] *Id.* at 3-5.
[649] Lee Chyen Yee & Samuel Shen, China suspends market circuit breaker mechanism after stock market rout, REUTERS (Jan. 7, 2016), *available at* http://www.reuters.com/article/us-china-stocks-idUSKBN0UL1RC20160107.

day with a full day 7-percent halt occurring only two minutes thereafter.[650] Two days later, the full day 7-percent halt was triggered again after only 33 minutes of trading, making it the shortest trading day in the history of the Chinese stock market.[651] As a result of these disastrous disruptions in trading, the circuit breaker was scrapped by the end of the week.[652]

We do not recommend further lowering the volatility thresholds for triggering market-wide circuit breakers. Instead, we recommend the calibration of the market-wide circuit breaker thresholds to respond to extreme volatility in a fixed number of securities. The threshold number or percentage of securities should represent a significant portion of the market, but should encompass scenarios where volatility may be concentrated in certain groups of securities. Such an approach should address situations like August 24, when volatility was particularly acute in markets for ETFs and their underlying securities, but not widespread enough to activate the circuit breakers. In addition, breaches of LULD thresholds (discussed below) should be treated as the signal of critical levels of volatility in individual stocks. In other words, market-wide circuit breakers should be activated once a fixed number of stocks have triggered LULD halts. Determining the exact number or percentage of securities that should trigger the circuit breakers is a highly technical question. The SEC should promptly appoint experts to research this issue and propose appropriate thresholds.

Specific Recommendation:

21. Thresholds for market-wide circuit breakers should be adjusted so that they are triggered when a pre-determined number of stocks or percentage of an index display extreme volatility by triggering their individual trading halts.

The Flash Crash and the August 24 market disruption each highlighted the significant interconnection between equity markets and futures markets. In the case

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[650] Alan Lok, *China's Circuit Breaker: Boon or Bane?*, CFA INST. (Jan. 14, 2016), *available at* https://blogs.cfainstitute.org/marketintegrity/2016/01/14/chinas-circuit-breaker-boon-or-bane/.
[651] *Id.*
[652] *Id.*

of the Flash Crash, activity in the futures market transmitted disruptions to individual stocks in the equity markets. In the case of the August 24, 2015 market events, prices in the futures market were severely dislocated from the prices of the underlying equities, further exacerbating uncertainty in both markets.[653]

This connection between equity markets and the futures market also impacts the effectiveness of volatility controls like market-wide circuit breakers. Without inter-market coordination, shutting down trading in one asset class could spur extreme disruptions in markets in related securities. Indeed, the Joint Report recommended that circuit breaker rules be applied to the futures market: "because markets are fragmented and inter-connected, regulatory attention must also focus on the linkages between and across markets, recognizing that coordination issues are fundamental to the efficient functioning of both equity and equity derivative markets."[654] For market-wide circuit breakers to have their intended effect of stabilizing trading by giving market participants time to respond to information, it is important that thresholds are harmonized between the equity markets and futures market.

Specific Recommendation:

22. The SEC and the Commodity Futures Trading Commission should work together to harmonize the thresholds for market-wide circuit breakers in the stock market with the futures market.

B. Trading Halts for Individual Stocks

Following the 2010 Flash Crash, the SEC implemented a "limit up-limit down" (**"LULD"**) mechanism that responds to abrupt and dramatic shifts in the

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[653] *See* BLACKROCK, *supra* note 628, at 7.

[654] Recommendations Regarding Regulatory Responses to the Market Events of May 6, 2010: Summary Report of the Joint CFTC-SEC Advisory Committee on Emerging Regulatory Issues 3-4 (Feb. 18, 2011), *available at* http://www.cftc.gov/idc/groups/public/@aboutcftc/documents/file/jacreport_021811.pdf.

price movements of *individual* securities.[655] LULD promotes the orderly functioning of markets in a manner similar to the market-wide circuit breakers. The mechanism prevents trade execution outside a fixed price band and institutes a trading pause if price volatility is not quickly corrected.[656] LULD therefore protects market participants from executing trades at extreme and unintended prices and provides time for them to respond to new information and adjust their orders during periods of extreme volatility. In addition, LULD responds more directly to the types of abrupt price declines that occurred during the Flash Crash, because it applies to the volatility of individual securities rather than market-wide volatility.

LULD imposes a price band within which trades in a certain security may occur. The band is based on the price deviation from the stock's average price over the most recent five minute trading period.[657] There are three primary price band groups, to which securities are assigned according to their price: 5%, 10%, or 20%.[658] The applicable band group is determined under an NMS Plan designed by the SROs.[659] Generally, the price band that applies to a stock becomes narrower as the price and liquidity of the stock increase.[660] This is because, for instance, a 5% price change in five minutes is more likely to constitute extreme volatility for highly liquid stocks that typically do not fluctuate in price in such a manner than it is for less liquid, highly volatile stocks that often fluctuate in this manner. During the open and close of the trading day, the price bands are doubled.[661]

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[655] *See* Joint Industry Plan; Order Approving the Tenth Amendment to the National Market System Plan to Address Extraordinary Market Volatility, Exchange Act Release No. 77679, File No. 4-631 2 (Apr. 21, 2016), *available at* https://www.sec.gov/rules/sro/nms/2016/34-77679.pdf.The pilot period is currently set to expire on April 21, 2017.
[656] Investor Bulletin: Measures to Address Market Volatility, U.S. SEC. & EXCH. COMM'N (Jan. 4, 2016), *available at* http://www.sec.gov/investor/alerts/circuitbreakersbulletin.htm.
[657] Plan to Address Extraordinary Market Volatility 8, *available at* https://www.sec.gov/news/press/2011/2011-84-plan.pdf.
[658] Investor Bulletin: Measures to Address Market Volatility, U.S. SEC. & EXCH. COMM'N (Jan. 4, 2016), *available at* http://www.sec.gov/investor/alerts/circuitbreakersbulletin.htm.
[659] *See* Plan to Address Extraordinary Market Volatility Submitted to The Securities and Exchange Commission Pursuant to Rule 608 Of Regulation NMS Under the Securities Exchange Act of 1934, *available at* https://www.sec.gov/rules/sro/nms/2015/34-75917-exa.pdf.
[660] *Id.* at Appendix A.
[661] *Id.* at 11.

When a security's quoted price is outside the applicable price band, trading in the security enters a 15 second "limit state."[662] During the limit state, trading is permitted only at prices that are at or inside the band, to allow the quoted price to stabilize.[663] If quotes do not return to a price within the price band after 15 seconds, a five minute trading pause is implemented.[664] After the five minute pause, the security's primary listing exchange re-opens trading in the security. The primary listing exchange also has authority to extend the pause for an additional five minutes.[665]

LULD was extensively deployed during the market events of August 24, 2015. As discussed in the previous section, there were roughly 1,300 LULD trading pauses throughout the day, and the widespread but non-universal halts likely fed the market instability. Indeed, the LULD mechanism is intended to respond to anomalous price movements in a small number of securities, while widespread events like that on August 24 may be better controlled by market-wide circuit breakers. Our approach in Recommendation 21 is intended to address such a scenario by coordinating LULD and market-wide circuit breakers to curb extraordinary market disruptions. In addition, we believe that certain key measures could enhance the effectiveness of LULD. The recommendations outlined by the NYSE in response to the August 24 market events are generally aligned with our suggested reforms.[666]

In our view, LULD price bands should be adjusted so that they are uniform throughout the trading day, rather than doubled during the open and close of

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[662] *See* BLACKROCK, *supra* note 628, at 8-9.
[663] *Id.*
[664] *Id.*
[665] *Id. See also* N.Y. STOCK EXCH., *supra* note 626; Letter to Brent J. Fields from Christopher B. Stone, FINRA, Re: Supplemental Joint Assessment on the Plan to Address Extraordinary Market Volatility, 14 (May 28,2015) *available at* https://www.sec.gov/comments/4-631/4631-39.pdf; Memorandum from EMSAC Trading Venues Regulation Subcommittee to Equity Market Structure Advisory Committee (EMSAC), Recommendations Relating to Trading Venues Regulation, U.S. SEC. & EXCH. COMM'N (Apr. 19, 2016), *available at* https://www.sec.gov/spotlight/emsac/emsac-trading-venues-subcommittee-recommendations-041916.pdf.
[666] *See* N.Y. STOCK EXCH., *supra* note 626, advocating changes to LULD procedures.

trading. The current doubling of bands during the first 15 minutes and last 25 minutes of the day effectively permits greater volatility during these periods. On one hand, wider bands during these periods makes sense: volatility is especially likely during the open and halts imposed at the close of trading could be exceptionally disruptive. However, the *inconsistency* in bands throughout the trading day can create problems, especially following a volatile open. Doubling the bands during the open allows extreme price deviations, but after 15 minutes LULD restrictions will become active at a much more moderate price. This inconsistency means that: (1) price volatility could result in immediate LULD halts after 15 minutes; and (2) prices will have a harder time self-correcting out of LULD states that were entered during the first 15 minutes of the day.

To illustrate the second point, suppose a security is subject to a 10% LULD price band. During the opening, the band would double to 20%. Therefore, if a security's price dropped 20% during the open, for example from $100 to $80, it would activate a "limit down" halt. After the first 15 minutes of the trading day, the LULD price band would drop to 10%. For the price of the security to then correct itself from $80 to $100 (i.e., increase $20), it would have to undergo two separate "limit up" halts at the normal 10% trigger. Thus not only do the current doubled price bands accommodate excessive volatility, but they impede the self-correction process.

Furthermore, on August 24 "limit up" halts (773) exceeded "limit down" halts (505) on a day with an overload of sells orders. This asymmetry further demonstrates that the narrowing of the price bands after the open constrained the recovery. We recommend that consistent LULD thresholds be applied throughout the trading day, including the market open and close. This change would promote predictability and better equip the markets to recover from volatile conditions.

Specific Recommendation:

23. The SEC should establish uniform LULD intraday price bands, instead of wider bands during the market open and close.

The LULD mechanism has the potential to serve a major stabilizing role in our markets. It controls unexpected volatility in individual stocks, so that public companies and their investors can be confident that erratic stock movements will be contained. And by quelling volatility in smaller groups of stocks, LULD can keep these anomalies from affecting the markets more broadly. However, the events of August 24, 2015 exposed certain flaws in the current LULD design. Below, we briefly identify these fundamental problems and potential reforms that we believe policymakers should further explore. Given their highly technical nature, we do not take a position on the advisability of any of these major reforms.

The first consideration worth noting is a potential adjustment to the time periods of the LULD limit state and trading pause to minimize market disruption. During the 15 second limit state, trading in a security is still permitted at prices that fall *within the applicable price band.* In contrast, the trading pause that results if a security's quoted price does not quickly normalize prohibits *all* trading in the security. The 15-second limit state is stabilizing by design, and extending the time period for the limit state could be helpful to give securities outside the LULD price band more time to self-correct. In contrast, a trading pause is somewhat disruptive by design. While a 5-minute trading pause affords market participants time to respond to volatility, it also interrupts trading and can create uncertainty as to whether trades will be executed as intended. Additionally, a five minute halt in trading is likely more time than necessary for market participants to adjust their trading and can delay the normalization of prices. We therefore tentatively believe that extending the LULD limit state and reducing trading pauses could be advisable.

We also note that a more dramatic overhaul of the LULD mechanism has recently gained momentum among market experts as a potential reform. This model typically incorporates (1) *adjustable* price bands for stocks that remain in limit conditions; (2) an extended limit state; and (3) the elimination of trading pauses.[667] The goal of this structure is to allow prices of a stock to organically

[667] Memorandum from EMSAC Trading Venues Regulation Subcommittee to Equity Market Structure Advisory Committee (EMSAC), Recommendations Relating to Trading Venues Regulation, U.S. SEC. & EXCH. COMM'N (Apr. 19, 2016), *available at*

move closer to equilibrium while avoiding trading halts. In theory, removing the trading pause not only curbs the disruptive nature of these pauses, but also obviates the need for re-opening processes and the problems that they can cause.

C. "Breaking" Clearly Erroneous Trades

SROs have the authority necessary to cancel, or "break," trades on any trading venue, if a trade exceeded a minimum percentage deviation from the last trade.[668] In other words, two counterparties that entered into a trade on an exchange would no longer be bound by their trade if an exchange broke that trade. Similarly, FINRA can break the trades of ATSs and broker-dealer internalizers.[669]

Historically, trades were generally broken when the price of an executed trade indicated that an obvious error existed, suggesting that it was unrealistic to expect that the counterparties had come to a meeting of the minds regarding the terms of the transaction.[670] The nullification of such "clearly erroneous trades" promotes fair and orderly markets and protects investors.[671]

However, prior to the Flash Crash, the SEC and FINRA had set low floors for granting SROs the discretion to cancel a trade and there was no percentage

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https://www.sec.gov/spotlight/emsac/emsac-trading-venues-subcommittee-recommendations-041916.pdf.

[668] Order Granting Approval of Proposed Rule Changes Relating to Clearly Erroneous Transactions, Exchange Act Release No. 62886, 4-5 (Sept. 10, 2010), *available at* https://www.sec.gov/rules/sro/bats/2010/34-62886.pdf.

[669] *See* FINRA Rule 11892 (amended 2015), *available at* http://finra.complinet.com/en/display/display_main.html?rbid=2403&element_id=8854.

[670] *See, e.g.*, Self-Regulatory Organizations; Philadelphia Stock Exchange, Inc.; Order Granting Approval of a Proposed Rule Change, as Modified by Amendment Nos. 1 and 2 Thereto, Relating to Obvious Errors, Exchange Act Release 57712, File No. SR-Phlx-2007-69 3 (Apr. 24, 2008), *available at* https://www.sec.gov/rules/sro/phlx/2008/34-57712.pdf.

[671] *See, e.g.*, Self-Regulatory Organizations; Financial Industry Regulatory Authority, Inc.; Order Granting Approval of Proposed Rule Change Relating to FINRA's Rules Governing Clearly Erroneous Executions, Exchange Act Release 61080, File No. SR-FINRA-2009-068 (Dec. 1, 2009), *available at* https://www.sec.gov/rules/sro/finra/2009/34-61080.pdf.
Pre-Flash Crash FINRA release: "These rules provide important safeguards against market disruptions caused by trader errors, system malfunctions or other extraordinary events that result in erroneous executions affecting multiple market participants and/or securities."

deviation that required an exchange to cancel a trade. For example, exchanges had the authority to cancel a trade if there had been only a 5% deviation from the previous trade in that stock, even if such volatility was common.[672] As a result, when market participants observed the extreme price volatility during the Flash Crash, they were aware of SROs' authority to cancel trades under the clearly erroneous trade rules, but the discretion built into those rules left them unsure as to which trades would be honored and which would be cancelled.[673] This negatively affected participation in the markets and the provision of liquidity.[674] For example, HFT market makers seeking to earn spreads could not accurately gauge their risk exposure, because certain trades could be cancelled. The SROs ultimately chose a 60% deviation from prices at 2:40pm as the threshold for trade cancellation that day, but did so "in a process that, from the perspective of market participants, was not clear or transparent, and led to further uncertainty and confusion in the market."[675]

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[672] Self-Regulatory Organizations; Order Granting Approval of Proposed Rule Changes Relating to Clearly Erroneous Transactions, Exchange Act Release No. 62886 4 (Sept. 10, 2010), *available at* https://www.sec.gov/rules/sro/bats/2010/34-62886.pdf.

[673] Recommendations Regarding Regulatory Responses to the Market Events of May 6, 2010: Summary Report of the Joint CFTC-SEC Advisory Committee on Emerging Regulatory Issues 7, 64 (Feb. 18, 2011), *available at* http://www.cftc.gov/idc/groups/public/@aboutcftc/documents/file/jacreport_021811.pdf; Self-Regulatory Organizations; Order Granting Approval of Proposed Rule Changes Relating to Clearly Erroneous Transactions, Exchange Act Release No. 62886 (Sept. 10, 2010), *available at* https://www.sec.gov/rules/sro/bats/2010/34-62886.pdf; Leonard J. Amoruso, Senior Managing Director and General Counsel, Knight Capital Group, Inc., Written Statement Submitted before the CFTC-SEC Advisory Committee 5-6 (Jun. 22, 2010), *available at* http://www.cftc.gov/ucm/groups/public/@newsroom/documents/file/jointmeeting062210_amoruso.pdf.

[674] Recommendations Regarding Regulatory Responses to the Market Events of May 6, 2010: Summary Report of the Joint CFTC-SEC Advisory Committee on Emerging Regulatory Issues 7 (Feb. 18, 2011), *available at* http://www.cftc.gov/idc/groups/public/@aboutcftc/documents/file/jacreport_021811.pdf.

[675] Self-Regulatory Organizations; Order Granting Approval of Proposed Rule Changes Relating to Clearly Erroneous Transactions, Exchange Act Release No. 62886 5 (Sept. 10, 2010), *available at* https://www.sec.gov/rules/sro/bats/2010/34-62886.pdf.

In September 2010, the SEC approved a rule that set bright-line thresholds at which trades must be broken.[676] The rule provides for trade cancellation based on a percentage deviation from a reference price for events relating to *multiple stocks* executed within a 5-minute period.[677] For events affecting 20 or more securities, executions at prices 30% or more from the reference price trigger cancellation, while a price deviation of 10% or more is the cancellation threshold for stock events involving 5 through 19 securities.[678] For events involving less than 5 securities, the numerical trade cancellation guidelines that applied before the Flash Crash continue to apply. Exchanges and FINRA are generally prohibited from canceling trades that do not exceed these minimums.[679]

Despite revisions to the clearly erroneous rules, uncertainty continued to play a role in the market disruption of August 24, 2015, so cancellation rules may need to be revisited. In particular, LULD thresholds and "clearly erroneous" thresholds are not the same. For example, an LULD halt might not be triggered for a stock unless its price is 40% away from the last sale. However, a trade in that same stock could be subject to a "clearly erroneous" review at just a 10% price deviation.

Indeed, we believe that the clearly erroneous standard and LULD thresholds should be revised so that a clearly erroneous trade would be prevented by the LULD threshold in the first place. Aligning the thresholds should eventually allow

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[676] *See id.* In 2014, the pilot period was updated to coincide with that for the Limit Up-Limit Down Plan. *See* Self-Regulatory Organizations; Order Granting Approval of Proposed Rule Changes Relating to Clearly Erroneous Executions, Exchange Act Release No. 72434 4-6 (Jun. 19, 2014), *available at* https://www.sec.gov/rules/sro/bats/2014/34-72434.pdf.

[677] Self-Regulatory Organizations; Order Granting Approval of Proposed Rule Changes Relating to Clearly Erroneous Transactions, Exchange Act Release No. 62886 5-6 (Sept. 10, 2010), *available at* https://www.sec.gov/rules/sro/bats/2010/34-62886.pdf.

[678] *Id.* The rules have recently been updated to account for "Multi-Day Events," in which a series of transactions in one security on multiple days can constitute one event that is eligible for cancellation. *See also* Self-Regulatory Organizations; Order Granting Approval of Proposed Rule Changes Relating to Clearly Erroneous Executions, Exchange Act Release No. 72434 5-6 (Jun. 19, 2014), *available at* https://www.sec.gov/rules/sro/bats/2014/34-72434.pdf.

[679] Self-Regulatory Organizations; Order Granting Approval of Proposed Rule Changes Relating to Clearly Erroneous Transactions, Exchange Act Release No. 62886 5-6 (Sept. 10, 2010), *available at* https://www.sec.gov/rules/sro/bats/2010/34-62886.pdf.

the automated LULD mechanisms to largely replace the outmoded and less predictable "clearly erroneous" process. This recommendation is echoed by the NYSE in its response to the August 24 market events.[680]

Specific Recommendation:

24. The SEC should eliminate clearly erroneous trade guidelines by aligning them with the thresholds for LULD rules.

D. Kill Switches

Mandatory kill switches on trading venues are intended to prevent market participants from experiencing losses due to malfunctioning software, errant algorithms or human errors that do not sufficiently move prices to trigger other volatility controls. For example, Knight Trading lost approximately $440 million in less than 45 minutes due to an errant software program.[681] Knight Capital's trades did not sufficiently move stock prices to trigger LULD or clearly erroneous trade thresholds and Knight had to bear its own losses. Had a kill switch been successfully implemented, Knight's losses would have been substantially mitigated.[682] Overall, the implementation of a standardized kill switch would help avoid significant market losses associated with human error and algorithm-related trading errors. Kill switches would also effectively reduce the risk of trading for automated market participants, including HFT market makers, thereby reducing their financial risk and potentially the transaction costs for investors that benefit from their services.

Kill switches halt trading for a specific market participant on a trading venue when that entity's trading activity has breached a pre-established exposure

[680] *See* N.Y. STOCK EXCH., *supra* note 626, at 4, recommending "[s]ynchronization of Clearly Erroneous Execution (CEE) and LULD bands."
[681] Whitney Kisling, *Knight Capital Reports Net Loss After Software Error*, BLOOMBERG (Oct. 17, 2012), *available at* http://www.bloomberg.com/news/2012-10-17/knight-capital-reports-net-loss-as-software-error-takes-toll-1-.html.
[682] Settlement Order, Knight Capital Americas LLC, Exchange Act Release No. 70694, File No. 3-15570 1, 4 (Oct. 16, 2013), *available at* https://www.sec.gov/litigation/admin/2013/34-70694.pdf.

threshold on that trading venue.[683] This is different from other volatility controls that stop trading for *all market participants* when the price volatility of the market or an individual stock exceeds a pre-determined threshold. Although a number of market participants have individual controls that operate like kill switches,[684] these kill switches can malfunction when a larger problem occurs at that firm.

Currently, certain exchanges have kill switches for broker-dealer members.[685] However, existing exchange-level kill switches are of limited usefulness for several reasons. First, these kill switches are optional and can slow trading for broker-dealers. This optionality enables and incentivizes broker-dealers to choose not to use kill switches, and if enough broker-dealers do not use the kill switches then they may not be effective in reducing market-wide volatility due to trading errors.[686] In addition, existing kill switches lack uniformity across exchanges.[687] A lack of uniformity "significantly reduces utility and efficacy because it requires significant resources to properly configure and maintain overlapping and inconsistent kill switch parameters at each exchange."[688] Due to the highly automated nature of algorithmic trading, it is particularly difficult for a market participant to adjust its trading programs to function compatibly with exchange-level kill switches that are designed differently.

We recommend that regulators require uniform, mandatory kill switches across exchanges for all broker-dealer members. Each kill switch should have an

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[683] *Prepared Written Testimony Before the S. Comm. on Banking, Housing, and Urban Affairs*, 113th Cong. 2 (2014) (statement of Hal S. Scott, Nomura Professor and Director of the Program on International Financial Systems, Harvard Law School).
[684] Loch Adamson, *Kill Switches Come to Life,* INSTITUTIONAL INVESTOR (Oct. 18, 2012), *available at* http://www.institutionalinvestor.com/article/3105080/banking-and-capital-markets-trading-and-technology/kill-switches-come-to-life.html#/.Vzqc8pErLIU.
[685] *See, e.g.*, NASDAQ, Equity Kill Switch: Frequently Asked Questions, *available at* https://www.nasdaqtrader.com/content/EquityKillSwitch.pdf.
[686] *See generally The Role of Regulation in Shaping Equity Market Structure and Electronic Trading: Before the S. Comm. on Banking, Housing, and Urban Affairs*, 113th Cong. 2, 8-9 (2014) (statement of Kenneth C. Griffin, Founder and Chief Executive Officer, Citadel LLC), *available at* https://www.citadel.com/_files/uploads/2014/07/Kenneth-Griffin-Written-Testimony.pdf.
[687] *Id.*
[688] *Id.*

automatic trigger at both the exchange and the exchange member when the relevant threshold is breached. These new kill switches should be standardized across exchanges, to facilitate market participants' understanding of applicable trading thresholds and to reduce the costs of shifting to this new regime.

Specific Recommendation:

25. The SEC should require mandatory kill switches on all exchanges for all exchange members.

E. Regulatory Trading Halts

Exchanges have the authority to call regulatory trading halts for their listed securities under the CTA Plan for NYSE listed securities or the UTP Plan for NASDAQ listed securities.[689] Once a listing exchange decides a regulatory halt is appropriate and institutes one, the listing exchange must notify other exchanges and FINRA.[690] Importantly, regulatory trading halts are generally effective across all trading venues.[691]

The CTA Plan and UTP Plan are both NMS Plans. Each plan similarly defines a regulatory trading halt as a halt or suspension of trading in a security because of: (i) inadequate or pending disclosure of material information to the public; or (ii) "regulatory problems relating to" a security "that should be clarified

[689] CTA Plan, *infra* note 692, at 48; UTP Plan, *infra* note 692, at 17.
[690] CTA Plan, *infra* note 692, at 48; UTP Plan, *infra* note 692, at 17.
[691] Bidisha Chakrabarty et al., When a Halt is Not a Halt: An Analysis of Off-NYSE Trading during NYSE Market Closures, JOURNAL OF FINANCIAL INTERMEDIATION 2 (2011), *available at* http://www3.nd.edu/~scorwin/documents/OffNYSETrading_000.pdf (noting that regulatory halts are "generally coordinated" across venues). When the NASDAQ institutes a regulatory trading halt for NASDAQ listed securities, all parties to the UTP Plan, which include NASDAQ exchanges, 11 other exchanges, and FINRA, shall "halt or suspend trading in that security until notified that the halt or suspension is no longer in effect." UTP Plan at 17. If the NYSE institutes a regulatory halt, technically the CTA Plan does not require other venues to halt trading in the security. CTA Plan at 48. However, CTA participants have their own rules that provide them authority to halt trading if NYSE institutes a regulatory trading halt. *See, e.g.*, FINRA Rule 6120(a).

before trading therein is permitted to continue," including extraordinary market activity due to system misuse or malfunction.[692]

However, in the event of operational difficulties (e.g., a SIP outage), the CTA Plan, UTP Plan and the exchanges' rulebooks do not include standardized rules for whether a regulatory trading halt should be implemented.[693] This broad discretion leads to unpredictability, which can discourage the provision of liquidity during operational failures.

For example, when the NYSE SIP went down on October 30, 2014, the NYSE did not call a regulatory trading halt. As a result, market participants were able to continue trading in NYSE-listed stocks, even though their ability to confirm that they were trading at the NBBO was limited.[694] As a result, broker-dealers facilitating trades for customers were unsure whether they were executing trades at a price that was inferior to the NBBO. Had there been clear standards in place for regulatory trading halts in the event of an operational failure, then this problem would have been avoided. To avoid such uncertainty in the future, we believe that it is important to have clear standards in place for such regulatory trading halts. The importance of these standards will only increase in the future as developments in financial markets introduce innovative new products to trading venues.

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[692] Second Restatement of Plan Submitted to the Securities and Exchange Commission Pursuant to Rule 11Aa3-1 Under the Securities Exchange Act of 1934, 48, *available at* https://www.nyse.com/publicdocs/ctaplan/notifications/trader-update/CTA_Plan_Composite_as_of_September_1_2015.pdf; Joint Self-Regulatory Organization Plan Governing the Collection, Consolidation and Dissemination of Quotation and Transaction Information for NASDAQ-Listed Securities Traded on Exchanges on an Unlisted Trading Privileges Basis, 5, *available at* http://www.utpplan.com/DOC/UTP_Plan.pdf.

[693] The listing exchanges' rules are not uniform or standardized regarding when a regulatory halt for operational difficulties should be implemented. For example, NYSE's rules generally permit the NYSE CEO to order a halt if it would be in the interest of "the maintenance of fair and orderly markets or protection of investors or otherwise in the public interest due to extraordinary circumstances." NYSE Rule 51(c). NASDAQ's rules also provide that it can halt trading in NASDAQ-listed securities in the event of operational difficulties resulting in "extraordinary market activity." NASDAQ Rule 4120(a)(6). In both cases, the exchanges are left with significant discretion.

[694] Nick Baker et al., *Disaster Averted in NYSE Stocks as Backup Feed Kicks In,* BLOOMBERG (Oct. 30, 2014), *available at* http://www.bloomberg.com/news/articles/2014-10-30/disaster-averted-in-nyse-stocks-as-backup-feed-kicks-in.

Specific Recommendation:

26. The SEC should clarify exchange regulatory trading halt procedures in the event of specific operational failures (e.g., SIP failure).

June 26, 2017

Chairman Bill Huizenga
Ranking Member Carolyn B. Maloney
House Financial Services Committee
Subcommittee on Capital Markets, Securities, and Investment
2129 Rayburn House Office Building
Washington, DC 20515

Re: Subcommittee Hearing, "U.S. Equity Market Structure Part I: A Review of the Evolution of Today's Equity Market Structure and How We Got Here."

Dear Chairman Huizenga and Ranking Member Maloney:

Thank you for holding this important hearing, "U.S. Equity Market Structure Part I: A Review of the Evolution of Today's Equity Market Structure and How We Got Here," and for the opportunity to offer suggestions on how to continue improving the US capital markets. We appreciate your focus on what's working well, and what isn't, in today's markets.

The purpose of this letter is to urge you to continue the critical, ongoing, bipartisan work towards modernizing oversight of the US capital markets. As we begin this discussion, it is important to note that the markets generally work well for most investors. However, over the past several years, high profile market disruptions and events, as well as troubling enforcement cases and press reports, have exposed some cracks in the foundation of our market structure.

In the attached Statement for the Record, we explore the issues and recommend a handful of updates and enhancements -- many of which are already under consideration by the SEC -- that could significantly improve market transparency, reduce risks to investors, and improve investors' execution quality.

We thank you again for holding this important hearing, and for the opportunity to submit the attached statement, which we ask be included in the hearing record. If you or your staff have any questions or comments, please feel free to contact me at (202) 909-6138.

Sincerely,

Tyler Gellasch
Executive Director

Statement of Tyler Gellasch, Executive Director of the Healthy Markets Association, before the House Financial Services Committee, Subcommittee on Capital Markets, Securities, and Investment

June 27, 2017

Chairman Huizenga, Ranking Member Maloney, and other members of the Subcommittee, thank you for holding this hearing, and for offering us the opportunity to provide this statement for the record.

As you begin your exploration of our markets, it is important to note that the markets generally work well for most investors. However, over the past several years, high profile market disruptions and events, as well as troubling enforcement cases and press reports, have exposed cracks in the foundation of our market structure.

A handful of updates and enhancements -- many of which are already under consideration by the SEC -- could significantly improve market transparency, reduce risks for investors, and improve investors' execution quality. Importantly, many of these enhancements require simply empowering investors with the information they need to make better, more informed decisions.

We appreciate your focus on identifying and working to address market participants' concerns. If the US capital markets are to remain the most robust, vibrant, and efficient in the world, improvements will need to be made. We thank you for working to do just that.

About Healthy Markets

The Healthy Markets Association is an investor-focused not-for-profit coalition working to educate market participants and promote data-driven reforms to market structure challenges.[1] Our members, who range from a few billion to hundreds of billions of dollars in assets under management, have come together behind one basic principle: Informed investors and policymakers are essential for healthy capital markets.

Since our launch in September 2015, we have become a leading voice for investors in the market structure debates. We have:

- Drafted dozens of unique reports and analyses regarding market structure and regulatory developments, including our industry-leading, monthly publication, "Market Structure Insights";
- Created two industry-leading "due diligence" questionnaires to assist investors and brokers in evaluating order routing practices and ATS risks; and

[1] Launched in 2015 by five leading buyside firms, Healthy Markets has since expanded to include nine buyside members and nine working group members. Prior to joining Healthy Markets as its first Executive Director, I served as Senior Counsel in the United States Senate, as well as Counsel to SEC Commissioner Stein. Prior to my government service, I practiced law in the field of securities regulation at leading law firms in New York City and Washington, DC. While in the US Senate, I worked as the lead staffer for several Senate Hearings and reports related to the US capital markets, including a post-Flash Crash hearing on the stability and integrity of the markets.

- Offered significant input to Congress, the Securities and Exchange Commission, and the SEC's Equity Market Structure Advisory Committee through dozens of meetings and comment letters.[2]

In the pages that follow, we offer a very brief overview of the past two decades of regulatory developments in US equities trading, and then highlight specific areas for potential improvement.

Background

The evolution of modern capital markets has been stunning in its speed and breadth. Order and execution information that was once communicated through hand signals and gruff voices now rockets around the world through laser beams, fiber optic cables, and microwave towers. Futures, equities, options, and other derivatives are traded seamlessly by computers in fractions of a second.[3] In the US equities markets, trading may now occur at any of several exchanges, several dozen dark pools, or hundreds of broker-dealer "internalizers." But it wasn't always this way.

For decades, trading in stocks was generally restricted to formally regulated exchanges dominated by a small handful of actors. Then, starting in the 1980s, following the Securities Act

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[2] For example, some of our relevant comments to the SEC and its Equity Market Structure Advisory Committee include:

- Statement of Healthy Markets Association Chairman Dave Lauer before the SEC Equity Market Structure Advisory Committee, May 11, 2015, *available at* https://www.sec.gov/comments/265-29/26529-15.pdf (re reforms to 611, 605, 606, market data costs, and other matters);
- Letter from Healthy Markets Association to SEC, Feb. 26, 2016, *available at* https://www.sec.gov/comments/s7-23-15/s72315-18.pdf (re reforms to ATSs' disclosures);
- Statement of Healthy Markets Association Director Chris Nagy before the SEC Equity Market Structure Advisory Committee, Aug. 2, 2016, *available at* https://www.sec.gov/comments/265-29/26529-80.pdf (re order routing disclosure reforms);
- Letter from Healthy Markets Association to SEC, Sept. 26, 2016, *available at* https://www.sec.gov/comments/s7-14-16/s71416-19.pdf (re order routing disclosure reforms);
- Letter from Healthy Markets Association to SEC, Dec. 23, 2016, *available at* https://www.sec.gov/comments/265-29/26529-1441899-130023.pdf (re access fee pilot);
- Letter from Healthy Markets Association to SEC, Jan. 6, 2017, *available at* https://www.sec.gov/comments/s7-14-16/s71416-1464340-130322.pdf (re order routing disclosure reforms); and
- Letter from the Healthy Markets Association to the SEC, Apr. 3, 2017, *available at* https://static1.squarespace.com/static/5576334ce4b0c2435131749b/t/58dfe79f1e5b6c817446e9b9/1491068831728/EMSACMtgLetter4-3-17.pdf (re priorities for SEC and EMSAC).

[3] While the hearing and the majority of this statement focus on the trading of US equities, we note that equities are just one asset type. In reality, equities, futures, and options are all inextricably linked. Perhaps the most infamous example of these connections was the May 6, 2010 "Flash Crash", in which unusual trading in the "E Mini" futures contract (traded on a futures exchange regulated by the CFTC) triggered a sell-off in the SPY (traded on equities exchanges regulated by the SEC), which itself triggered sell-offs in individual equities and options. See Report of the Staffs of the CFTC and SEC to the Joint Advisory Committee on Emerging Regulatory Issues, Sept. 30, 2010, *available at* https://www.sec.gov/news/studies/2010/marketevents-report.pdf.

Amendments of 1975[4], a host of new options began to emerge. These new trading venues have come to be called "alternative trading systems" or ATSs. Many large institutional investors have been drawn to dark pools over exchanges because dark pools may allow them to execute trades in larger sizes without tipping off predatory traders or significantly impacting market prices.[5]

The proliferation of these venues was driven, in part, as a result of frustrations with the perceived abuses of New York Stock Exchange specialists and traditionally high trading costs. Market participants and regulators alike sought to--and did--foster competition with the removal of NYSE Rule 390.

At first, there was extremely little regulatory oversight of these new execution venues. Then, in 1998, the SEC adopted Regulation ATS, which required all ATSs to be registered as broker-dealers, thus subjecting dark pools to FINRA oversight. As part of this process, all ATSs had to file basic disclosures with the SEC about their operations and meet other regulatory requirements.

As the SEC was beginning to regulate theses new market venues, they were also beginning to improve oversight on brokers' order routing decisions. As the number of venues proliferated, the decision of where (and how) to send an order to buy or sell stock into the market became increasingly important for investors and their brokers. Each execution venue has its own set of costs and benefits, both explicit and implicit. In 2000, the SEC adopted the forerunner to Rule 606 (Rule 11Ac1-6),[6] which was intended to inform brokers and investors about how brokers routed their orders.

We witnessed first hand the impact of the reports on competition and behavior in the marketplace.[7] The new disclosures promoted informed competition and aided in best execution. they allowed firms to examine their execution quality, and helped brokers compare themselves to their peers. They also gave investors information about how certain brokers generally routed orders. Investors and brokers changed behavior based on what they saw.

Unfortunately, those disclosure obligations for ATSs and order routing reports are nearly entirely obsolete. Much of this obsolescence is due to the fundamental changes in trading securities over the past two decades. There are more exchanges, more dark pools, and more ways to trade. Order handling practices and order types have changed. Time horizons have shrunk.

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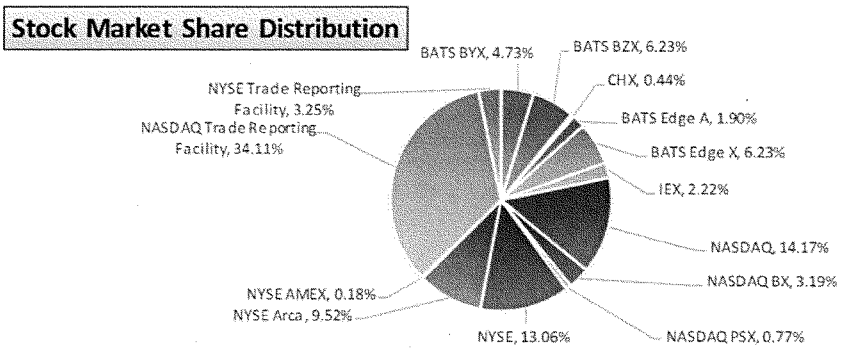
[4] Securities Acts Amendments of 1975, Pub. L. 94–29 (1975).

[5] As one finance professor commented to the SEC during its consideration of Regulation ATS, "Instinet began because institutions wanted an anonymous way to trade large blocks of stocks thereby minimizing information leakage." Letter from Daniel G. Weaver, Associate Professor of Finance, Baruch College, to Jonathan Katz, Secretary, Sec. and Exch. Comm'n, Nov. 23, 1998.

[6] Rule 11Ac1-6, which the SEC redesignated into Rule 606 in 2005, was first proposed by the SEC at the end of July 2000. 65 Fed. Reg. 48406 (Aug. 8, 2000).

[7] Chris Nagy, a Board Member for Healthy Markets, has been actively engaged with the SEC for decades, and his opinions on these issues are routinely sought by market participants and regulators. More recently, Mr. Nagy spoke with the SEC's Equity Market Structure Advisory Committee on August 2, 2016 about reforms to brokers' and venues' order routing disclosures.

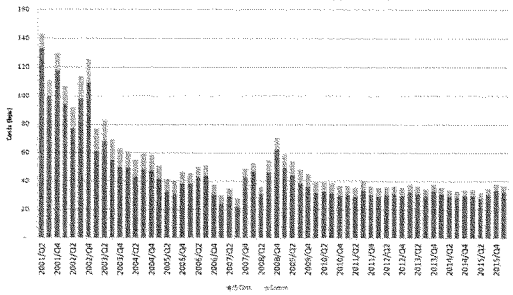
As the following chart demonstrates, trading volumes have also dramatically shifted away from being dominated by the two primary listing exchanges to being more readily split between the three major exchange families (Intercontinental Exchange's NYSE, Nasdaq, and CBOE's BATS), as well as a number of smaller exchanges and an increasing number of significant dark pools.



Somewhat surprisingly, despite the rise in competition amongst trading venues, and the dramatic decreases in explicit costs (e.g., commissions), the overall costs of trading haven't fallen that much. In fact, a study by ITG found that implementation costs for large block trades dwarf the commissions paid to brokers, as shown in the chart below.[8]

Implementation Shortfall and Commission Costs

Data as of December 31, 2015, Implementation Shortfall and Commission Costs for Large Cap Stocks in the USA
Source: Investment Technology Group



[8] Meaningful trading analytics is significantly limited by the availability of comprehensive data. This block trading data, obtained from ITG, Inc., is referenced here to be illustrative of the relative weights of commissions versus other costs of trading (such as price movements immediately after trade execution). This reiterates the need for regulators to improve fairness and transparency in the markets by improving the collection and publication of meaningful order and execution statistics.

Thus, despite lower commissions in US equities trading, and robust competition amongst trading venues, the overall costs of trading have remained steady. Institutional investors, who have fiduciary duties to their customers, continue to look for ways to reduce these costs. Investment advisers are thus increasingly focused on their true and total costs of trading; the vast majority of which are likely these "implementation" costs--not just the commissions.

Unfortunately, despite imposing a legal obligation to protect their customers, the outdated regulatory regime does little to inform and empower investors seeking to meet their obligation. In the absence of many explicit regulatory protections or relevant disclosures, many institutional and retail investors have been left to question whether their brokers are routing orders to venues most likely to achieve the best fills, or instead sending their orders to the venues that maximize the brokers' profits. These concerns have been highlighted by academic research, press reports, recent regulatory actions, a best-selling book, and even Congressional hearings.[9]

Regulation NMS, which was adopted more than a decade ago, was a complex, comprehensive ruleset intended to foster competition amongst trading venues, while also protecting investors. Unfortunately, it has become wildly outdated, leaving significant opportunities for abuses and stability risks. After nearly a decade of inaction, in recent years regulators have begun to intervene with significant actions against several of the largest, most well-respected firms for market-structure-related abuses, including:

- Barclays,[10]
- Citadel,[11]
- ConvergEx,[12]
- Credit Suisse,[13]
- Deutsche Bank,[14]
- eBX, LLC (LeveL),[15]

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[9] See, e.g., *Conflicts of Interest, Investor Loss of Confidence, and High Speed Trading in U.S. Stock Markets*, before the U.S. Senate Permanent Subcomm. on Investigations, Comm. on Homeland Sec. and Gov't Affairs, (2014) (statements and video *available at* https://www.hsgac.senate.gov/subcommittees/investigations/hearings/conflicts-of-interest-investor-loss-of-confidence-and-high-speed-trading-in-us-stock-markets); see also *Computerized Trading Venues: What Should the Rules of the Road Be?*, Before the Subcomm. On Securities, Insurance, and Investment of the Senate Comm. on Banking, Housing, and Urban Affairs, (2012).

[10] In the Matter of Barclays Capital Inc., Exch. Act Rel. No. 34-77001 (Jan. 31, 2016), *available at* https://www.sec.gov/litigation/admin/2016/33-10010.pdf.

[11] In the Matter of Citadel Securities LLC, Exch. Act Rel. No. 34-79790 (Jan. 13, 2017), *available at* https://www.sec.gov/litigation/admin/2017/33-10280.pdf.

[12] In the Matter of G-Trade Services LLC, ConvergEx Global Markets Limited, and ConvergEx Execution Solutions LLC, Exch. Act Rel. No. 34-71128, (Dec. 18, 2013), *available at* https://www.sec.gov/litigation/admin/2013/34-71128.pdf.

[13] In the Matter of Credit Suisse Securities (USA) LLC, Exch. Act Rel. No. 34-77002 (Jan. 31, 2016), *available at* https://www.sec.gov/litigation/admin/2016/33-10013.pdf; see also In the Matter of Credit Suisse Securities (USA) LLC, Exch. Act Rel. No. 34-77003 (Jan. 31, 2016), *available at* https://www.sec.gov/litigation/admin/2016/33-10014.pdf.

[14] In the Matter of Deutsche Bank Securities Inc., Exch. Act Rel. No. 34-79576 (Dec. 16, 2016), *available at* https://www.sec.gov/litigation/admin/2016/33-10272.pdf.

- Goldman Sachs,[16]
- ITG,[17]
- Liquidnet,[18]
- Pipeline,[19] and
- UBS.[20]

Some of these firms were simply lax with their customers' confidential information. Others weren't protecting their customers in the ways they claimed or giving their customers the "best" prices. Others were offering secret advantages to favored trading firms. Still others were the very predatory traders whom they were purportedly protecting investors against.

In addition to these market integrity concerns, some market participants and investors have become increasingly concerned with overall market stability. As demonstrated by the May 6, 2010 "Flash Crash," the interconnections between futures (like the E-Mini futures contract), equities, options, and other derivatives, trading across numerous venues subjected to different regulatory regimes, open up opportunities for significant stability risks. Fortunately, since then, the SEC has led significant reforms that have dramatically reduced some of the risks of catastrophic spikes and collapses in asset prices. While these issues should not be overlooked (particular with respect to the interactions of ETFs and broad-based futures contracts), we nevertheless remain optimistic that the SEC's existing regulatory regime remains well-positioned to protect investors and the markets.

However, market integrity is still a significant concern. If Congress and the SEC are to ensure that the US equity markets remain the best in the world, a number of market structure reforms should be implemented.

Market Structure Reforms

Market participants all recognize the needs for some basic reforms. There is even significant consensus amongst many diverse market participants regarding the substance of most of the needed improvements. We urge Congress and the SEC to capitalize on those areas, and implement several critical enhancements.

In particular, we urge Congress and the SEC to work to focus on enhancing transparency and reducing conflicts of interests facing market participants. These efforts include:

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[15] In the Matter of eBX, LLC, Exch. Act Rel. No. 34-67969 (Oct. 3, 2012) (regarding the operations of LeveL).

[16] In re Goldman Sachs Execution & Clearing, L.P., Letter of Acceptance, Waiver, and Consent, No. 20110307615-01, (Jun. 3, 2014), *available at* http://disciplinaryactions.finra.org/Search/ViewDocument/36604.

[17] In the Matter of ITG, Inc. and AlterNet Securities, Inc., Exch. Act Rel. 34-75672 (Aug. 12, 2015), *available at* https://www.sec.gov/litigation/admin/2015/33-9887.pdf.

[18] In the Matter of Liquidnet, Inc., Exch. Act Rel. 34-72339 (June 6, 2014), *available at* https://www.sec.gov/litigation/admin/2014/33-9596.pdf.

[19] In the Matter of Pipeline Trading Systems LLC, Fred J. Federspiel, and Alfred R. Berkeley III, Exch. Act Rel. No. 34-65609 (Oct. 24, 2011), *available at* https://www.sec.gov/litigation/admin/2011/33-9271.pdf.

[20] In the Matter of UBS Securities LLC, Exch. Act. Rel. 34-74060 (Jan. 15, 2015), *available at* https://www.sec.gov/litigation/admin/2015/33-9697.pdf.

1. Finalizing enhancements to disclosures of order routing by brokers;
2. Significantly reducing or eliminating incentives that distort order routing behavior and pose conflicts of interest, including rebates and access fees;
3. Finalizing enhancements to disclosures by execution venues, and particularly Alternative Trading Systems (ATSs);
4. Reducing the use of, and significantly reform, NMS Plan structures; and
5. Offering clarity on reconciling disparate provisions between the US and Europe's MiFID II regime.

We also note that Congress and the Commission are currently being urged by some market participants and their advocates to eliminate certain provisions from Regulation NMS. In this regard, we urge caution. While we agree that some provisions within Regulation NMS (such as the Order Protection Rule) may lead to perverse and sub-optimal outcomes (particularly for orders of significant size, without a tailored block exemption), we also note that these protections serve an important purpose for both "retail" and institutional investors. The Order Protection Rule is one of the only explicit protections that investors have to force their brokers to demonstrate best execution. Put simply, it is the best execution backstop.

If these protections are reduced or eliminated, investors first need to have adequate safeguards in place to ensure: (1) brokers are still fulfilling their duties of best execution, (2) investors have the ability to verify that their brokers have fulfilled their legal obligation, and (3) investors have the ability to change their behavior in response to what they learn. Eliminating the Order Protection Rule and the prohibition on locked and crossed markets prior to adopting reforms to Rules 605, 606, and 610 would likely result in significant harm to investors. And even with enhanced disclosures, elimination of the Order Protection Rule without other reforms will likely shift significant burdens (and costs) onto buyside firms to ensure that they are receiving even reasonable quality executions.

Adopt Reforms to Order Routing Disclosures

Order routing disclosure obligations are well overdue. It's been 17 years since the SEC's order routing rules were first adopted, and nearly every element of them is no longer relevant. Trading isn't measured in seconds or minutes anymore; it's measured in microseconds.

At the same time, numerous regulatory enforcement actions and press reports have made it clear that some brokers' order routing practices have been disadvantaging their customers. Although specifics may differ between so-called "retail" and institutional investors, the overarching concern is the same. [21]

[21] Healthy Markets generally objects to the characterization of "retail" investors as those who trade primarily through individual, often online brokers. As numerous studies have demonstrated, these individuals often have significantly greater wealth and financial resources than those who invest predominantly through institutional investment advisers. Thus, if policymakers and regulators are truly seeking to protect "mom and pop retail," it will ensure that its regulatory regime appropriately informs and empowers institutional investment advisers, like those who are members of Healthy Markets, who manage the bulk of savings and retirement assets.

Investors' orders are often routed in ways that may be worse for investors, but better for their brokers. In most cases, the investors will never know that their brokers' self-interested desire to avoid a fee, or collect a payment, or hit a pricing tier at a venue, resulted in a worse execution.[22]

Many institutional investors have invested years of effort and millions of dollars engaging in "self help." They have created or used significant "due diligence" questionnaires. In fact, our Members have directed us to help them identify and address concerns with brokers' order routing practices. The Healthy Markets Order Routing Transparency Initiative is a multi-pronged effort to do just that. These efforts have included:

- Development and publication of the Healthy Markets Order Routing Questionnaire to help investors make more informed broker selection decisions;
- Development of Order Routing Disclosure best practices and working with individual firms to improve disclosure practices;
- Development and publication of unique reports related to key issues impacting broker order routing practices; and
- Offering suggestions to regulators and the public, including through regulatory comment letters.

The Healthy Markets Order Routing Questionnaire, which was released in January 2017, is particularly informative.[23] This Questionnaire is a comprehensive list of more than 200 questions that can help investors better understand the practices and operations of their brokers. Again, none of this information is currently specifically required to be disclosed, yet much of it may be covered by reforms to Rule 606.

In addition to increasingly using questionnaires, institutional investors have developed extremely sophisticated trading strategies and analytical tools. Unfortunately, the efficacy of their efforts is nearly entirely dependent upon the voluntary cooperation of their service providers. As you might imagine, larger investors (with more order flow to leverage) are often able to enjoy more cooperation from their service providers. Even then, information provided is often incomplete and difficult to compare across different firms.

Last year, the Commission proposed reforming order handling disclosures, which would level the playing field for investors and shed significant light on many current practices.[24] This is an important effort, and Healthy Markets has offered extensive commentary on both the need for these reforms and potential further enhancements.[25]

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[22] Often, the data that would be required to accurately measure the quality of the execution is simply unavailable to the investors. Further, even in the rare instances that reasonable information may be available, investors (particularly those trading through online, discount brokers) may be unable to bring the comprehensive financial and personnel resources to bear that would be necessary to make sense of it. Worse, even if those two conditions are met, there is often limited recourse for an investor.

[23] The Healthy Markets Order Routing questionnaire is freely available to the public at: https://healthymarkets.org/order-routing-questionnaire.

[24] *Disclosure of Order Handling Information*, Securities and Exchange Commission, 81 Fed. Reg. 49432 (July 27, 2016), *available at* https://www.gpo.gov/fdsys/pkg/FR-2016-07-27/pdf/2016-16967.pdf.

[25] See, e.g., Statement of Healthy Markets Association Director Chris Nagy before the SEC Equity Market Structure Advisory Committee, Aug. 2, 2016, *available at* https://www.sec.gov/comments/265-29/26529-80.pdf; Letter from Healthy Markets Association to SEC, Sept. 26, 2016, *available at* https://www.sec.gov/comments/s7-14-16/s71416-19.pdf; and Letter from Healthy Markets Association to SEC, Jan. 6, 2017, *available at* https://www.sec.gov/comments/s7-14-16/s71416-1464340-130322.pdf.

Reduce Distortive Incentives, or at a Minimum, Adopt an Access Fee Pilot

As execution venues have proliferated, so have the various avenues for competition amongst them. Most notably, many execution venues have sought to compete on price, such as by offering rebates and different pricing tiers for customers. With different combinations, each venue may have dozens of different prices that could apply to different customers--none of which is readily apparent. At the same time, these incentives for trading typically accrue to the brokers--not the underlying investors on whose behalf the order is being placed.

As we have said before, this creates a

> fundamental conflict of interest for brokers looking to route their customers' orders. At its worst, a broker is incentivized to route an order to the venue that pays it the most (or costs the least), instead of the venue that that has the highest likelihood of execution fostering best execution for its customers.[26]

We are pleased at the growing consensus of market participants that have joined our longstanding calls for the elimination or significant reduction of rebates and other distortive incentives.[27] In large part because we believed the SEC was unlikely to aggressively limit these conflicts of interest, we and others have, for years, argued for the SEC to implement a pilot program to study the impact of this conflict of interest on investors.

Healthy Markets and the SEC's Equity Market Structure Advisory Committee have detailed proposals to implement such a study. While we might prefer Congress to direct the Commission to take more aggressive action, if the SEC chooses to conduct a formal study, we would urge the SEC to adopt a comprehensive pilot study without delay.[28] In addition to the thoughtful recommendations of the EMSAC, we would also urge the Commission to (1) directly propose the pilot program, and not use the NMS Plan process; (2) simplify the study as much as possible, while also including all relevant exchanges and ATSs; and (3) offer the Canadian regulators an opportunity to coordinate a similar effort.[29]

Reducing the myriad conflicts of interest facing brokers should be a key objective towards promoting more fair and efficient capital markets.

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[26] Letter from Healthy Markets Association to SEC, Dec. 23, 2016, *available at* https://www.sec.gov/comments/265-29/26529-1441899-130023.pdf (citing, *inter alia*, *Conflicts of Interest, Investor Loss of Confidence, and High Speed Trading in U.S. Stock Markets*, Hearing before the Permanent Subcommittee on Investigations, Committee on Homeland Security and Government Affairs, June 17, 2014, *video available at:* http://www.hsgac.senate.gov/subcommittees/investigations/hearings/conflicts-of-interest-investor-loss-of-confidence-and-high-speed-trading-in-us-stock-markets).

[27] See, e.g., Letter from SIFMA to SEC, Mar. 29, 2017.

[28] A simpler approach might be to run a pilot eliminating rebates.

[29] See Letter from Healthy Markets Association to SEC, Dec. 23, 2016, *available at* https://www.sec.gov/comments/265-29/26529-1441899-130023.pdf.

Adopt Reforms to Regulation ATS

Amidst a slew of regulatory enforcement actions against ATS operators, in November 2015, the SEC proposed significantly expanding and improving the disclosures required of ATSs that trade NMS stocks (NMS Stock ATSs).[30]

Investors and brokers now know that many of the oldest, largest, and most well-respected execution venues have broken the law.[31] Some of these infractions have been relatively minor, while others have consisted of the ATS operator deceptively acting as the very type of predatory trader that it was publicly arguing it was protecting its customers against.

Unfortunately, as the SEC recognized in its proposed reforms to Reg ATS, the current regulatory regime is woefully inadequate to empower investors and brokers with the information they need to reasonably protect themselves.

In fact, to help fill this void, the Healthy Markets Association's members have directed us to engage in our ATS Transparency Initiative, which is a multi-pronged effort to enhance ATS disclosure practices. Our work on this initiative has included:

- Development and publication of the Healthy Markets ATS Questionnaire to help investors and routing brokers make more informed venue selection decisions;
- Creation and distribution of the ATS Transparency Index™, which provides a unique system to help inform market participants of ATSs' transparency and disclosure practices;
- Creation and distribution of the 2016 ATS Risk Assessment, which provides comprehensive comparisons and analyses of 18 leading ATSs, on issues ranging from conflicts of interest to technology risks;
- Development of ATS disclosure best practices and working with individual ATSs to improve disclosure practices;
- Development and publication of unique reports related to key issues impacting ATSs, including the Dark Side of the Pools: What Investors Should Learn from Regulators' Actions; and
- Offering suggestions to regulators and the public regarding the regulation of ATSs, including through regulatory comment letters.

The Healthy Markets ATS Questionnaire, which we publicly released in September 2015, is particularly noteworthy.[32] That ATS Questionnaire arms investors and brokers with dozens of questions to ask their ATSs on issues ranging from technology to conflicts of interest to quantitative measurements of executions. Importantly, almost none of this information is currently explicitly required by Regulation ATS. Equally important, much of this information has been included in the Commission's proposed reforms to Regulation ATS.

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[30] Regulation of NMS Stock Alternative Trading Systems, 80 Fed. Reg. 80998 (Dec. 28, 2015) (the "Proposal").

[31] To date, regulators have settled cases against the operators of many of the leading equity ATSs, including Barclays, Convergex, Credit Suisse, Deutsche Bank, eBX (LeveL ATS), Goldman Sachs, ITG, Liquidnet, Pipeline, and UBS.

[32] The Healthy Markets ATS Questionnaire is freely available to the public at: https://www.healthymarkets.org/ats-questionnaire.

Nevertheless, as we articulated in our February 2016 comment letter,[33] we encourage the SEC to revise its proposal to:

- Expand the coverage to include ATSs beyond those that trade NMS stocks;
- Consider eliminating conflicts of interest by prohibiting an ATS operator or an affiliate from trading on a principal basis in the ATS, or at a minimum, on terms any different than unaffiliated third-parties;
- Expand reporting of order and trading metrics so that market participants may better evaluate venue performance and conflicts of interest; and
- Modernize and mandate Rule 605 disclosure for all NMS ATS operators separate and distinct from any affiliated broker-dealer.

Since the Commission proposed its Reg ATS reforms nearly 18 months ago, only more troubling practices have come to light. Unfortunately, investors and brokers looking to protect themselves have been left in the terrible position of being aware of problems, but also largely unable to address them.

We hope you will urge the SEC to adopt revised ATS reporting obligations on a bipartisan basis without delay.

Significantly Reduce the Use of NMS Plan Process and Reform NMS Plan Governance

We agree with the growing chorus of market participants and experts that argue that NMS Plan usage and governance deserves significant reforms, including through the direct inclusion of other market participants.

However, we believe that the NMS Plan process is deeply conflicted and outdated. Since it was first adopted, the self-regulatory organizations (SROs) have both proliferated in number and become for-profit entities. Conceptually, we are concerned any time the regulatory apparatus is outsourced to market participants whose financial interests may be in conflict with their regulatory responsibilities.

This concern is not just theoretical. The recent history with NMS Plans, particularly regarding the design and implementation of the Consolidated Audit Trail and the Tick Size Pilot, have been disappointing at best. Administratively, these plans are burdened with an incredible amount of process and frequent delays. Substantively, these plans also have tended to show a distinct bias towards the market participants involved in their creation and adoption (the SROs). For example, we find it puzzling how little of the costs of the CAT will be borne by the actual exchanges, and how much will be borne by the broker-dealer community.

Simply broadening participation to include more for-profit market participants (such as broker-dealers and investment advisers) may reduce concerns with the balance of the substantive results of NMS Plans, but may also lead to regulatory stagnation and generate even more conflicts of interest. It will almost assuredly not speed up or ease the administration of these plans, and will likely have the opposite effect.

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[33] Letter from Healthy Markets Association to SEC, Feb. 26, 2016, *available at* https://www.sec.gov/comments/s7-23-15/s72315-18.pdf.

We urge Congress to revisit the law creating this deeply flawed process. At the same time, we urge the SEC to reduce its outsourcing of its governmental responsibilities, and use the NMS Plan process infrequently. This would allow the SEC to avoid issues created merely by the conflicts of interest that plague the NMS Plans. In that vein, we were encouraged by then-Acting Chairman Piwowar's recent remarks that an Access Fee Pilot would be done as an SEC rule, and not as an NMS Plan.

Further, to the extent that the NMS Plan process is still utilized, we encourage the SEC to: (1) significantly modify the governance to include significant voting representation of other non SRO market participants, (2) increase transparency of market data costs, and (3) adopt measures to prevent deadlocks and undue delays. Without these measures, we fear that NMS Plans will continue to be examples of self-regulation at its worst: self-interested, conflicted, and slow.

Offer Clarity on Reconciliation of US and EU Obligations for Best Execution and Research Payments

In the US, investment advisers are statutorily permitted to pay for research using commission dollars, if certain criteria are met. For many asset managers, particularly small and mid-sized, active managers, this is a critical element to their ongoing business. At the same time, several very large US firms have sought—for more than a decade—to unbundle research and execution costs, and have been largely unsuccessful.

Some brokers who provide research have refused to accept cash payments for their research, while others have accepted cash payments or commission dollars.

Now, MiFID II in Europe, which becomes effective in January 2018, is pushing firms to use Research Payment Accounts or pay directly in hard dollars. This move is driving many firms to develop costly compliance regimes for research provision and payment, but also appears to be inconsistent with Section 28(e). Further, many investment advisers with US and European customers are being pressured to develop consistent policies and practices.

There are a number of thorny issues that could use regulatory input. For broker-dealers, just an acknowledgement that a cash payment may be permissible in some circumstances (i.e., broadening the no-action relief currently provided to some brokers) would resolve significant regulatory uncertainty. For investment advisers, guidance on trade and research allocations could be appropriate. For example, if a portfolio manager generates an order for one million shares of stock, and that order is to be allocated to two different funds, one subject to US rules while the other is subject to EU unbundling rules, how should the adviser allocate the trades, commission costs, and research costs? While splitting the clients into two groups may seem an easy and logical solution, this in practicality may present some challenges, as more often than not client orders are combined into blocks for purposes of seeking best execution and operational efficiency. A re-affirmation of Section 28(e), as well as guidance on compliance with the inconsistent regulatory regimes facing US firms (perhaps structured as a safe harbor) would be greatly appreciated.

Don't Leave Investors Without Order Protection

At its root, Regulation NMS is designed to protect investors through a combination of disclosures, obligations, and prohibitions. Put simply, the collective ruleset is intended to ensure that investors receive best execution. And the rules are designed to work together. For example, as our Chairman explained to the EMSAC in May 2015:

> Rule 611 sought to provide strong intermarket price protections and offer greater assurance on an order-by-order basis. Rules 605 and 606 were intended to supplement Rule 611 by providing transparency into execution quality and broker order routing, thereby empowering investors to make informed decisions based on quantitative metrics.[34]

The objective of Rule 611 is very clear: ensure investors get the best available prices. In fact, Rule 611 is one of the few protections that investors have in place which serves as a backstop on an order-by-order basis to ensure that they are receiving the best price in the market.[35]

Some market participants and their advocates are now asserting that Rule 611 should be eliminated. However, to support this argument, they have offered no specific evidence that Rule 611 has proven harmful on any grand scale, nor have we seen any specific evidence to support the assertion that it is the root cause of increased fragmentation and complexity in US markets. That said, we recognize that Rule 611, as it currently exists within the rest of Reg NMS, has several flaws and detractors.

Some have argued that Rule 611 may:

- Subsidize non-viable exchanges;
- Increase connectivity costs to the industry;[36]
- Create unnecessary complexity and intermediation, including the promotion of complex order types; and
- Maintain a one-size-fits-all market that has not served small- and mid-cap companies well.

We urge you to work with your fellow Commissioners and Commission staff to consider several refinements to Regulation NMS in addition to those identified above, including:

- Modernizing brokers' best execution obligations, including more quantitative analysis and more rigorous review of executions;
- Re-examining order handling and routing by exchanges generally, including a reexamination of complex order types; and
- Boldly exploring ideas to reduce distortive incentives, including rebates, access fees and the consolidation of multiple exchange subsidiaries.

If the Commission elects to adopt changes to Rule 611, we might consider shifting the responsibility of order protection on an order-by-order basis in Rule 611 from the exchanges back to the brokers and expanding its scope to provide protection to the displayed "depth-of-book."[37]

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[34] Statement of Healthy Markets Association Chairman Dave Lauer before the SEC Equity Market Structure Advisory Committee, May 11, 2015, *available at* https://www.sec.gov/comments/265-29/26529-15.pdf.

[35] Id.

[36] We note that these costs may also be up because of market venues' decisions to repeatedly increase their various data fees, which are rarely scrutinized or rejected, and the proliferation of venues.

[37] In its 2010 concept release, the Commission sought input on various provisions to promote displayed liquidity, such as expanding depth-of-book protections under Rule 611.

Rule 611 serves as an imperfect backstop to a broker's best execution obligation, by ensuring that an investor should not generally receive an execution outside the prevailing market. If the backstop is removed or weakened without the implementation of new protections, investors will be more at risk to their brokers' conflicts of interest. Brokers will remain incentivized to route orders for reasons other than best execution, but will have even less of a standard against which to measure their own obligations. Investors will remain largely unable to identify and police abuses. Put simply, removing Rule 611 now will harm investors.

This is not a theoretical concern; as data suggests, brokers are already making order routing decisions based on their own bottom lines, and not necessarily the execution quality received for their customers.[38] Currently, these practices are bound by Rule 611 to result in executions that are within the market prices. This acts as a practical limit to the number of trade-throughs which is what the Commission originally sought to reduce through the adoption of the rule. It caps the amount of losses an investor could suffer from a conflicted broker. If Rule 611 is removed or weakened, then those losses would not be easily identified and limited.

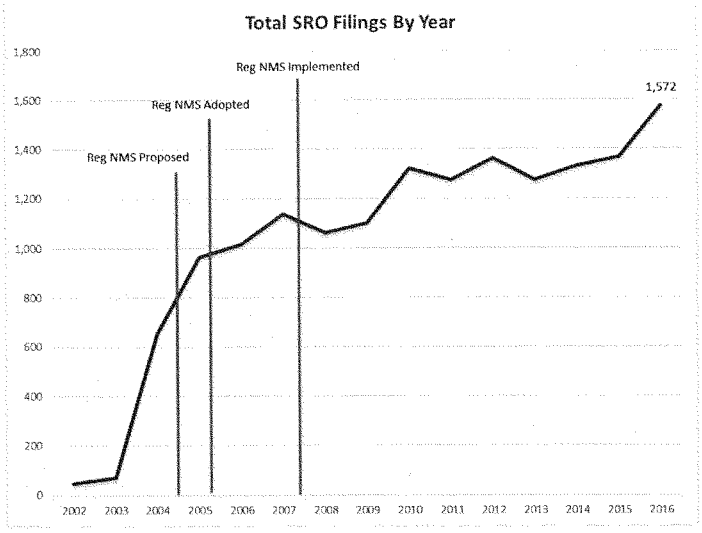
We urge Congress and the SEC to consider all of these issues and rules collectively, as modifications to one rule (such as the Order Protection Rule) could have significant ramifications on other key trading rules (such as best execution). In general, we support reducing conflicts of interest and distortionary incentives, while increasing transparency.

Exchange Filings, Fees, and Market Data Costs Keep Climbing

The process used by exchanges to set fees is also in need of reform to increase transparency and reduce conflicts of interest. Exchanges looking to change their rules or take other actions need to file their changes with the SEC. Unfortunately, this reasonable approach to increase transparency has led to an ever-rising flood of SRO rule filings.

The explosion of SRO filings over the last decade is best demonstrated in the following chart. Following the adoption of Regulation NMS, filings have increased at a steady pace each year, setting up 2017 to outpace 2016's number.

[38] For example, IEX currently occupies just 2% market share, despite consistently showing the lowest effective spread in the most symbols, as measured to the millisecond. For information on execution quality, please see "Execution Quality", BATS, *available at* http://www.bats.com/us/equities/market_statistics/execution_quality/ (last viewed Mar. 10, 2017). Similarly, TD Ameritrade has stated that it has consistently routed orders to the venues that pay it the most. Scott Patterson, *TD Ameritrade Executive Says Orders Go to Venues That Pay Highest Fees*, Wall St. Journal, June 17, 2014, *available at* https://www.wsj.com/articles/td-ameritrade-executive-says-orders-go-to-venues-that-pay-highest-fees-1403043559 (quoting TD Ameritrade testifying before Congress).



Market participants simply cannot keep up with them. Unfortunately, given the incredible volume, we also suspect that the SEC staff can't either. While some of these filings are relatively straight-forward, with easy-to-see implications, many are not. Many filings, such as filings related to order types and fees, may appear simple on their face, but may have extremely complex implications and impacts on not just the filing venues, but on other market participants. Unfortunately, given the sheer volume and the abridged time horizon within which the SEC is expected to respond, we suspect that many of these complexities are never explored.

By default, nearly all filings are approved. Most receive no comments.[39] Market participants (and, we suspect, the SEC staff) are simply overwhelmed.

As a result, two areas that have come to be key points of competition between the exchanges have led to a proliferation of complexities and expenses for market participants: order types and fees. The discussions regarding the proliferation of order types at market venues have gone on for years, spurred in part by SEC investigations and high-profile enforcement actions against market venues for creating predatory order types. Importantly, while the operators of many execution venues have professed a desire to eliminate some of this complexity, the order type complexity still abounds. This is further complicated by the interactions between different market venues. Unfortunately, this complexity makes it both likely for nefarious order types to exist, and also difficult for market participants or regulators to identify and stop manipulative or disruptive behavior.

[39] Less than 2% of the 1572 filings we reviewed in 2016 received comments.

Perhaps one of the greatest concerns for many market participants these days is the proliferation of market data and other fees. It's no secret that execution venues compete on price. As part of that ongoing competition, exchanges have developed complex tiered pricing regimes and market data fee structures. Collectively, these fee structures dramatically impact where orders are routed, and how much market participants pay.

On the other hand, one area that is not necessarily prone to competition is market data. And here's why: each exchange is a mini-monopoly. We believe the record on this point has been well-established by SIFMA and the NetCoalition in their ongoing dispute with the Commission.

Every routing broker and market maker, to be competitive, must have timely access to the broad spectrum of available information, including depth-of-book information from every major execution venue. In other words, no matter what the cost is, an institutional broker cannot simply "opt out" of paying the "voluntary" fee for more information faster, or his business will simply evaporate. He would be unable to provide adequate service to his customers, and would likely consistently provide lower-quality executions. He may even be violating his duty for best execution.

Exchanges are unquestionably aware of their unilateral monopoly pricing power over data fees. For example, NYSE has expanded its assertion of data control and fees in several different ways in recent years[40]. There are almost never any details explaining or justifying any fee increases[41].

At the same time, the SEC is tasked with ensuring the fees are "reasonable." While individual increases may not appear to be so egregious as to be facially unreasonable, collectively, the exchanges seem to have clearly crossed the blurry line. The Commission has allowed the exchanges to raise the fee temperatures to a boil, and other market participants, including both brokers and investors, are now being burned by the scalding fees.

Market data fees are little more than government mandated and government sanctioned monopolies for the now "for profit" exchanges. Market data fees are taxes on all market participants that the government has obligated market participants to pay and have remained unchanged since the adoption of the Securities Act Amendments of 1975. Meanwhile, exchanges have morphed from mutual entities to for-profit publicly traded companies. We urge Congress and the SEC to step in. The SEC must accept its role in approving the amount of these taxes and the frequency with which the rates change.

We urge the SEC to rapidly adopt a clear, public framework for evaluating any fee change proposals, particularly the "reasonableness" mandate of any fee increase, and if it fails to do so, for Congress to step in. Congress and the SEC should directly address the role regulations

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[40] In April of 2017, NYSE introduced a revised Master User Agreement that implies that NYSE owns the data that brokers submit to it when they buy and sell stocks.

[41] For example, in May 2017 Nasdaq filed (Release No. 34-80808; File No. SR-GEMX-2017-20)to begin charging $1,250 per month, per computer port, for a specialized quote feed. In its filing, Nasdaq merely cites that it is in accordance with Section 6(b)(8) of the Exchange Act.

have played in creating the opportunity for exchanges to extract these significant monopolistic rents from market participants.

Caution on Certain Capital Formation Initiatives

Many companies, consultants, and other experts have observed the troubling decline in IPOs, as well as the increasing concentration of capital in some of the largest firms. We agree with many of these concerns.

However, some "solutions" to the reduction in new public securities and increased concentration seem to be focused on reducing costs and perceived burdens on public corporate issuers, or oddly, making it easier to raise capital and trade privately.

These solutions seem to ignore the comparative ease of raising private capital and the increasing tradability of restricted securities.[42] Also, none of these solutions address some of the structural advantages of larger firms (such as lower funding costs or access to advanced tax planning techniques). Ultimately, as long as firms can have multi-billion dollar valuations, thousands of shareholders, and even easy trading without ever being a "public" company, we think the current troubling trends will continue.

Unfortunately, further expanding the abilities of (1) companies to raise capital (particularly equity) outside of the registration process, and (2) shareholders to trade otherwise restricted securities may expose many investors to even greater risks and costs.

The benefits to investors of publicly traded securities are numerous. Public securities often are accompanied by more robust accounting and business disclosure practices. They also are far more easily and reliably valued--an area of particular interest recently. The liquidity risks and trading costs are often significantly lower than for similarly-situated private securities. Public securities are also much more easily benchmarked, such as against the S&P 500.

Thus, as you consider efforts to spur capital formation, we urge you to lean in favor of promoting more robust public markets. This will likely mean revising the contours of the numerous duplicative, overlapping and often nonsensical collections of exemptions from registration requirements of the Securities Act.

Finally, we urge caution in reforming requirements for public markets. As corporate issuers have increasingly turned to private capital and M&A activity, businesses, Congress, and regulators have increasingly sought to "restore balance" by removing some costs and burdens associated with public offerings or being a company with publicly traded securities. Some have even

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[42] Elisabeth de Fontnay, The Deregulation of Private Capital and the Decline of the Public Company, 68 *Hastings Law Journal* 445-502 (2017), *available at* http://scholarship.law.duke.edu/faculty_scholarship/3741/.

proposed entirely different rules for trading shares for smaller public companies, from wider tick sizes to wholesale exemptions from Regulation NMS.

We are skeptical that these types of reforms will be effective at spurring additional IPOs or public securities. However, these efforts may negatively impact shareholders--deteriorating the quality of public offerings and the rights afforded shareholders in those offerings. We urge you to go in the opposite direction. We urge you to promote higher quality public markets with greater accountability, reliability, and price transparency.

Conclusion

Amidst growing concerns about the integrity and stability of the U.S. capital markets, market participants, experts, and policymakers have been clamoring to modernize disclosures and the basic ground rules for equities trading for years. If the US capital markets are to remain the best in the world, we urge you to work with investors and other market participants to implement some modest, but essential, reforms without delay.

Thank you for your consideration and for the opportunity to offer remarks at this important hearing.