EQUITY MARKET STRUCTURE: A REVIEW OF SEC REGULATION NMS

HEARING

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WITNESSES

FRIDAY, FEBRUARY 28, 2014

APPENDIX

EQUITY MARKET STRUCTURE: A REVIEW OF SEC REGULATION NMS

Friday, February 28, 2014

U.S. HOUSE OF REPRESENTATIVES,
SUBCOMMITTEE ON CAPITAL MARKETS AND
GOVERNMENT SPONSORED ENTERPRISES,
COMMITTEE ON FINANCIAL SERVICES,
Washington, D.C.

The subcommittee met, pursuant to notice, at 9:30 a.m., in room 2128, Rayburn House Office Building, Hon. Scott Garrett [chairman of the subcommittee] presiding.

Members present: Representatives Garrett, Hurt, Royce, Neugebauer, Huizenga, Stivers, Fincher, Mulvaney, Hultgren, Ross; Maloney, Hinojosa, Lynch, Scott, Himes, Peters, Foster, Carney, and Kildee.

Ex officio present: Representative Hensarling.

Chairman GARRETT. Greetings. The Subcommittee on Capital Markets and Government Sponsored Enterprises is hereby called to order. Today's hearing is entitled, "Equity Market Structure: A Review of SEC Regulation NMS." Let me thank all the members of the panel for being with us here today. We will begin in regular order with our Members' opening statements and then proceed to the panel after that.

I now yield myself 8 minutes for an opening statement. Today's hearing will focus on the structure of our Nation's equity markets—in other words, the stock market—and will provide a retrospective review of Regulation National Market System (Reg NMS) which was adopted by the SEC in 2005. I do want to thank our esteemed panel for joining us here today to provide their expert testimony on a very important topic. I also want to thank the ranking member for her attention to these important issues and the constructive bipartisan job that she has done to promote strong capital markets here in the United States.

Mrs. Maloney, along with Mr. Hurt and Mr. Grimm and Mr. King, as well as Commissioner Dan Gallagher, joined me at a roundtable on market structure up in New York back in May. That was a great opportunity to hear from some of the foremost experts on the history and evolution of the equity markets and the regulatory regime governing those markets. While modern equity markets trace their origin back to an agreement signed under the buttonwood tree on Wall Street in 1792, over time these markets have become essential to Main Street as well.

Companies all around the country need robust equity markets to raise capital to grow their business and create jobs. Likewise, in-

vestors require fair, efficient, and competitive equity markets so that they can do things like invest for their retirement, buy a home, or pay for a child's education. And so, I commend Chair White and her fellow Commissioners for their commitment to prioritize a review of equity markets and the rules that govern them.

A comprehensive review hasn't been conducted by the SEC since 1994, yet the structure of these markets and the rules, including NMS, look much different today. Another review is long overdue, and the unanimous agreement of the SEC on this point, which seems rare these days, speaks volumes to the significance of this issue.

Before Congress and the SEC can take another hard look at the U.S. equity market, however, I believe it is important to set a baseline to suggest a few basic parameters for this review. First, U.S. equity markets are among the deepest, most liquid, and lowest cost markets in the world. This does not mean that these markets are perfect, that there is no room for improvement. There is. It simply means that when we review the market structure and explore making future changes, we must keep in mind the axiom, "First, do no harm."

Second, a review of the equity market structure must be based on a deep set of objective data rather than anecdotes or politically convenient arguments. It follows that we should avoid, at the outset, buying into a sensational narrative in the media that portrays fast markets that rely on computer technology as inherently fragile or bad for investors before we even have a chance to collect and analyze all the data on it.

I know that the very capable staff at the SEC's Division of Trading and Markets is in the process of gathering and examining quality data with their new Market Information Data Analytics System (MIDAS). I also look forward to the arrival of the Division's new Director, Stephen Luparello, who has shown an impressive grasp of these complex issues. I am pleased that the SEC appears to recognize the importance of making any future decisions on equity market structure based on empirical economic data that has been peer-reviewed and formally commented on by the public and by market participants.

Third, a quality review must put everything on the table. In other words, it should be truly comprehensive. We simply will not be able to form a complete picture of how our equity markets work, and develop smart reforms to improve these markets, if we are not prepared to ask all the tough questions and reassess every aspect of market structure. This includes reevaluating the objectives and impacts of Reg NMS, and other regulations concerning equity markets, as well as congressional mandates such as the Security Acts Amendment of 1975.

Last but not least, we must resist all calls to impose additional layers of complex regulations on individual market participants in order to control or influence their behavior before we understand the underlying drivers of those behaviors. While I agree that we must take a close look at high-frequency trading, broker-dealer internalization, the proliferation of order types, the maker-taker model, and trading in so-called "dark pools," the first steps should

be to determine how and why these behaviors and business models developed.

To the extent that the regulatory regime played a role, I question whether adding another layer of new rules onto an already complex structure will do anything to actually improve this structure or protect investors.

This brings us back to the subject of today's hearing. Recently, Reg NMS has been identified as a potential source of problems occurring in the U.S. equity markets. A central part of the SEC's review of the equity market structure, therefore, should be to determine whether regulations, including NMS, are driving market complexity and dislocation and incentivizing suboptimal behavior by market participants.

For example, by linking all market venues together through technology, prioritizing price and speed in executing orders, and protecting only automated quotations, has Reg NMS been the primary contributor to what we may now lament as needlessly complex and fragmented equity markets? Have these efforts to link markets together to promote a national market system also led to the many recent disruptions which originate at one location and then seem to ripple throughout the system?

Recent data also suggests a rise in volatility in the market post-Reg NMS. Is this because Reg NMS led to an increase in the amount of high-speed algorithmic trading in the markets? Is it related to the so-called end-of-market sweep exception of Reg NMS or the protection rule?

So in addition, there are literally hundreds of different complex order types that exist in today's equity markets, and these unique order types develop as strategies to get around the market protection of top-of-the-book quotes in NMS or exploit other market participants. These are just some of the questions about Reg NMS that need to be explored.

At this point, I don't believe anyone has a definitive answer to any of these questions, but they leave the door open to the possibility that the government's own rules might be at the center of the problem. That is precisely why any serious review of equity market structure must include an examination of these complex issues and ask the difficult questions.

This all-encompassing review should also assess the regulatory regime that governs various intermediaries in the market, ways to improve disclosure of post-trading pricing and routing decisions to investors, and additional ideas to ensure that intermediaries are acting in the best interest of their customers.

I know this will not be an easy task, but I am hopeful that Chair White, the other four Commissioners, the SEC staff, and this subcommittee will devote the necessary time, energy, and effort to study these important issues. We owe it to the investors and the issuers who depend on these markets to facilitate the appropriate flow of capital.

Finally, in a recent speech on the need to review market structure, current SEC Commissioner Michael Piwowar recently succinctly noted, "In order to move forward, we must look back." I sincerely agree with the Commissioner, and I look forward to beginning this through a look back on Reg NMS with today's panel.

And with that, I yield back, and at this point I recognize the gentlelady from New York, the ranking member of the subcommittee, Mrs. Maloney, who has taken a lead interest in all of these issues, for 5 minutes.

Mrs. MALONEY. I want to thank the chairman for calling this hearing, and for your very informative conference that we had earlier in New York on market issues. And I thank all of the distinguished panel members, including the former head of the SEC. We welcome your comments today.

This is a very important hearing, and I would like to thank you for your leadership and for the willingness to tackle this in a nonpartisan way. The United States has the deepest, most liquid, and most effective capital markets in the world. The U.S. stock market is 13 times larger than the British stock market and 14 times larger than Germany's stock market. The strength of our markets is a key contributor to our country's overall economic strength. We need to continually work to make sure that our markets are safe, competitive, innovative, and fair to all investors.

The sheer size of our stock market is attractive for investors because they know they will be able to sell their investment quickly if they need to. Investors also know that they will get the best price available to them when they do decide to sell their stocks, which increases the attractiveness of trading in our markets.

The purpose of this hearing is to review the foundation of our successful market structure, and particularly Regulation NMS, the National Market System. When the SEC passed Regulation NMS in 2005, the goals were to promote price competition, protect investors, and enhance market efficiency. Now, nearly 9 years later, it makes sense for Congress to take a step back, review the changes that have taken place, and ask what we did get right in Regulation NMS, what we did get wrong, and what can we improve?

Price competition has undoubtedly increased as the number of different trading venues available to investors has exploded. Some in the markets argue that the 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, and whether we have the right balance is one of the issues I hope we will explore today.

But if we have learned anything from Regulation NMS, it is that even small changes in market structure regulations can have large consequences. That is why I think the best changes in market structure will be grounded in data and empirical evidence. I am pleased that the SEC is already developing a tick-size pilot program to test whether tick sizes for stock trading really will enhance liquidity, and this one pilot program will look at raising it from a penny to 5 cents.

And as we explore other potential changes to our market structure, we should also keep in mind that our equity markets are undoubtedly better today than they were a decade ago. Today's retail investors have better access to the markets and at lower costs than ever before. It is important not to lose sight of these benefits.

I look forward to a robust, informative discussion from our distinguished panel, and I yield back the balance of my time.

Chairman GARRETT. The gentlelady yields back.

The vice chairman of the subcommittee is recognized for 2 minutes.

Mr. HURT. Thank you, Mr. Chairman. Mr. Chairman, thank you for holding today's hearing. And I want to thank our witnesses for joining us today to examine Reg NMS and our Nation's equity market structure.

Last Congress, this subcommittee led the charge to pass the JOBS Act to decrease burdensome regulations and provide incentives for emerging growth companies to access capital and public markets. While we continue to see successes of the JOBS Act, it is essential that we also ensure that our equity markets themselves are functioning as efficiently and effectively as possible. Our markets and the technology underpinning them have continued to advance quickly in the year since Reg NMS was implemented. I believe this hearing is an important opportunity to allow Members to explore how it is that our equity markets have evolved since that time and potentially where they are headed in the future.

I agree with others who have called for a wholistic review of the Nation's market structure. This issue is too important and too complex for a disjointed review that could lead to unintended consequences. It is imperative that we get this right, not only for the markets but for retail investors, pensioners, emerging growth companies, and all market participants.

I am encouraged that Chair White and all of the SEC Commissioners have publicly supported the idea of this review of our equity market structure. I look forward to moving this process forward so we can ensure that the United States continues to have the most efficient, competitive, and liquid markets the world has ever known. I would like to thank our witnesses again for their appearance. I look forward to your testimony.

Mr. Chairman, I yield back my time.

Chairman GARRETT. The gentleman yields back.

Mr. Lynch for 2 minutes.

Mr. LYNCH. Thank you very much, Chairman Garrett and Ranking Member Maloney, for holding this hearing. And I want to thank the panelists for coming forward and for your willingness to help the subcommittee with its work. This hearing on equity market structure is long overdue. It is an important issue that we need to be addressing.

The U.S. equity markets are often described as the deepest and most transparent in the world, and I guess that is probably true. And it is true because the vast majority of the trading in the United States, about 63 percent this past January, is conducted on open and transparent exchanges with robust pre- and post-trade transparency. An open market obviously reduces spreads, decreases volatility, and creates a safer environment for investors.

However, over the past 5 years there has been a marked increase in the volume of trades that are being conducted in dark pools or opaque alternative markets, and that is a real problem. Off-exchange trading has expanded by some accounts from 15 percent to 40 percent over recent years.

There are some legitimate reasons for the use of dark pools. I know that institutional investors execute large volume trades

which can't necessarily be performed well on open markets because of the likelihood that there may be some actors out there trying to game those trades. However, we are seeing a trend where trading that should normally be able to be conducted on open exchanges, public exchanges, is going off exchange, and that is a problem. We should be fostering policies which ensure that all trading can be done on open and public exchanges to the extent possible, and we should ensure that for off-exchange trading, when necessary, we still have a window to observe that trade is being done in the most transparent manner possible.

I look forward to the testimony. I have some questions for you that I hope you can help us with. And again, I want to thank the witnesses for their willingness to come forward and help the subcommittee.

I yield back the balance of my time.

Chairman GARRETT. The gentleman yields back.

Mr. Scott, for 3 minutes, please.

Mr. SCOTT. Thank you very much, Mr. Chairman. And this is indeed a very, very important hearing, a critical hearing to be able to really examine the equity market structure. Specifically, though, I think we need to really gear in on the SEC's regulations of the National Market System, which is commonly referred to as Reg NMS.

There are two principles that are outlined in Reg NMS: the first one is competition among markets and competition among orders; and the second one is serving the interest of long-term investors' listed companies. The point is that while Reg NMS appears to have been a success in increasing competition among markets, given the significant growth of what is referred to as dark trading, this dark trading volume, which is now 40 percent of average daily volume in this country, is in the dark, and an increase in liquidity fragmentation, 13 equity exchanges, around 45 dark pools, and many more broker-dealer internalizers. NMS appears to have resulted in not more competition, but less competition among orders.

And in addition, many large institutional investors who act on behalf of long-term investors have raised concerns about the extreme fragmentation of liquidity and a lack of disclosure coming from dark trading venues.

So the ultimate question I think we have to answer today is, has order competition decreased, and what should the SEC do about this? Shouldn't the SEC be looking for ways to rebalance this? I think this is the overreaching, overarching issue in question that we have to answer today because many investors are concerned with these dark pools, and that process is not increasing competition but lessening competition, and we must do something to address that. And it would be good to examine what steps must be taken to make sure there is adequate competition.

Thank you, Mr. Chairman. I yield back.

Chairman GARRETT. The gentleman yields back.

We now turn to our panel. And again, I thank every member of our panel for being with us today. For those of you who have not testified before, I always do the admonition to make sure that you pull the microphone close to you because sometimes I can't hear up here. You all will be recognized for 5 minutes. And without objec-

tion, your complete written statements will be made a part of the record, so we ask you to summarize your testimony right now in 5 minutes. We will start, as we always do, from left to right.

Former SEC Commissioner Campos, good morning, and welcome to the panel.

STATEMENT OF THE HONORABLE ROEL C. CAMPOS, PARTNER, LOCKE LORD LLP; AND FORMER SEC COMMISSIONER (2002–2007)

Mr. CAMPOS. Chairman Garrett, Ranking Member Maloney, and members of the subcommittee, thank you very much for inviting me here today. It is a privilege to be here with you. And I agree that the Reg NMS and the U.S. capital market structure is a very worthy subject of your consideration. I appreciate that you are working very closely with the Securities and Exchange Commission, my old agency.

As you know, I served as a Commissioner of the Securities and Exchange Commission from 2002 to 2007. During my service, I was part of the Commission that implemented Sarbanes-Oxley, and part of the Commission that, with the work of the SEC staff, adopted Regulation NMS. I was there when all of the considerations, all of the battles, all of the presentations, and all of the arguments about market structure, about different business models were debated, considered, and presented.

I will be brief. My testimony and written portions of it will be a part of the record.

First, I agree with the comments that have been made by the Members. Today's U.S. markets are the envy of the world. When I was a Commissioner at the SEC, I had the privilege of representing the agency internationally, and what I discovered internationally was that the largest investors of various countries invest in the United States. And I remember distinctly a manager of a sovereign wealth fund that invested billions of dollars in the United States said to me, "I invest in the United States because I know, first of all, that my investments there are safe. If something wrong happens, I can get redress in your courts. And secondly, I can get good prices and a fast reaction."

This feature, that the U.S. markets bring foreign capital into the United States, is a huge benefit and a huge feature of our particular markets. I agree that nothing is perfect. Any system needs to be revisited. And our National Market System, I am sure, could be improved. However, as my father used to say, and as all of you have noted, we shouldn't be fixing what isn't broken.

So let me just very briefly tell you about what we thought about with the staff and the Commissioners that I was a part of when we looked at NMS. We saw a system that was not working very well. We saw traditional exchanges that gave opportunities to flow brokers to trade ahead, to give them many seconds of advantage in being able to work trades. We heard that individual investors and institutional investors were not getting fair executions and fair prices, and we heard that the markets overall were not working well.

So, our first and foremost objective was to create a system in which investors were treated fairly and were treated safely. And as

has been noted, the 1975 Congress actually gave the SEC the direction to establish the National Market System, and it gave the Commission the guidelines which were to be the areas that it was supposed to concentrate on: efficient execution; fair competition; transparency; market access; and dealer disintermediation.

One of the things we wanted to do was to accommodate the unique features of the American system, which is that we have many different trading centers. We wanted the markets to make the choices as to which of the different trading centers and market models would survive the markets. So our system essentially had another concept, and that is that it was a system, not a building, not a buttonwood tree, but a system of many centers that needed to be electronically connected.

So today, when people talk about fragmentation, be careful. If we have a system that is connected, you may have liquidity from different sources, but it doesn't mean that it is necessarily fragmented. It doesn't mean that investors today are not getting the best price. And I assure you that today, the prices and the executions investors receive are far better than they were in 2002, when I ended up voting to approve the NMS.

Clearly, the markets need some regulation. Our history is clear that bad things happen when there isn't any regulation. So the question is not whether there will be regulation, but how much, and what is the right balance. Also, technology is the big issue of the day.

[The prepared statement of Mr. Campos can be found on page 32 of the appendix.]

Mr. HURT [presiding]. Mr. Campos, thank you very much.

The Chair now recognizes Mr. Steven Lofchie.

Thank you for being here. You are recognized for a period of 5 minutes.

STATEMENT OF STEVEN LOFCHIE, PARTNER, CADWALADER, WICKERSHAM & TAFT LLP

Mr. LOFCHIE. Thank you very much for having me, Chairman Garrett and Ranking Member Maloney. My name is Steven Lofchie, and I am head of the financial regulation practice at Cadwalader, Wickersham & Taft. In addition to practicing law in the area of financial regulation for the past 20 years, I have also written a number of books on the topic including, "The Guide to Broker-Dealer Regulation," which is commonly regarded as the standard text in the area.

I have prepared written testimony that I have submitted for the record. Again, I am very appreciative of the opportunity to testify to the subcommittee on the rules governing the equity markets.

Since 1975, the operation of these markets has been governed by the principles that Congress established in Section 11A of the Securities Exchange Act of 1934, that there should be efficient trade execution and fair competition, and that market data should be made widely available. But while the principles established in 1975 still hold true today, today's problems are not the same problems that existed in 1975.

Then, the problems of the equity markets were the problems of the near monopoly of the NYSE at the time which stifled innova-

tion, the snail's pace of trade execution, and that the exchanges were largely private clubs at which admission was limited by members. Those problems of 1975 have been remarkably well-addressed thanks to the regulatory efforts of the SEC and the technological innovation and the competitiveness of market participants. Unlike in 1975, trades are executed in milliseconds, bid and ask spreads are at a penny, numerous exchanges and alternative trading systems compete, and trade information is real time.

But today's markets present different problems. Today's problems, in fact, are so different from those which existed in 1975 that they are almost the mirror of them. Instead of trading being too slow, perhaps it is too fast. Instead of too much reliance on an individual specialist, perhaps we are too vulnerable to technology failures. Instead of exchanges being private clubs where members have an interest in the support of the organization and vice versa, today the exchanges have become business organizations with distinct interests from their members. Instead of trading on a monopoly market, trading is fragmented or dispersed, depending upon your choice of words.

This means that if the SEC assumes it can address the problems of today's market using the same tools and the same rules that it did in 1975, there is a danger it will worsen problems rather than resolving them. Forty years after Section 11A was adopted, as you have all noted, it is time for the SEC to take a ground up look, and it must study not only the front page matters, such as market volatility and technology vulnerability, it must also look at behind-the-scenes issues such as market data feeds and how those impact market trading incentives.

The SEC must also conduct a self-examination as to its own assumptions of how markets work. The markets, as they exist today, and as they existed in 1975, are not simply the the result of interaction between buyers and sellers. They are also very much a creature of market regulation. The NYSE was able to dominate trading for so long not because it had a better market, but because rules permitted it to disadvantage competition. When the current set of market rules were adopted, the dissenting Commissioners worried that these rules would increase fragmentation and volatility. Those concerns have proved justified.

In addition, it makes sense to look at regulatory structure. Does it make sense for the exchanges to regulate their competitors? And finally, I want to talk about the issue of technology failure. How do we deal with the technology failure that is such a front page issue? One of the things I have suggested in my written testimony is that we look at other models of regulation, such as the airline industry, where the focus is more on gathering information as to how a problem occurs.

Thank you very much for inviting me to the hearing, and I look forward to questions.

[The prepared statement of Mr. Lofchie can be found on page 36 of the appendix.]

Mr. HURT. Thank you, Mr. Lofchie.

The next witness is Mr. Erik Sirri, former Director of the SEC Division of Trading and Markets.

Thank you for being here, and the Chair recognizes you for 5 minutes.

STATEMENT OF ERIK R. SIRRI, PROFESSOR OF FINANCE, BABSON COLLEGE; FORMER SEC CHIEF ECONOMIST (1996–1999); AND FORMER DIRECTOR OF THE SEC DIVISION OF TRADING AND MARKETS (2006–2009)

Mr. SIRRI. Chairman Garrett, Ranking Member Maloney, and members of the subcommittee, thank you for having me here today to testify.

U.S. equity markets consist of more than a dozen registered exchanges and more than 60 market centers. Their efficiency is remarkable. Today, a modern electronic market maker that trades as much as 15 percent of a large-cap NASDAQ stock may earn as little as 1 or 2 hundredths of a penny for every share it trades. The old worries about a dominant market maker being a monopolist have been replaced by new issues concerning fair access, connectivity, computerized trading, and the robustness of systems.

Reg NMS today is almost 9 years old, and still, it remains a rule with both proponents and detractors. It highlights the fact that market structure regulation is necessarily a difficult exercise. For example, traders value confidentiality for their orders because unnoticed trading results in better prices for traders' ultimate customers. Any regulatory desire to increase market transparency is constrained by a trader's desire for secrecy. Traders forced into a transparent market against their wishes will elect not to submit their orders into the market and will hold them upstairs until they are ready to trade. There is thus a limit on how much transparency can be brought to any marketplace.

As a second example, not even the strictest regulations can force liquidity providers or market makers to provide liquidity to a marketplace if it is not profitable for them to do so. They will simply exit the market. This principle contributed to the demise of traditional market makers and specialists on physical exchanges like the NYSE.

U.S. equity markets are generally very efficient. Changes of fees of as little as one-tenth of a cent per share will clause flow to move from one venue and cause it to be rerouted to another market center as brokers attempt to lower trading costs or earn higher rebates from their customer flow. This is both a testament to the quality and efficiency of our markets and a cautionary tale to regulators. It demonstrates how sensitive market participants' business models are to very small changes in costs and how quickly trading platforms, brokers, and investors react to changes in the competitive landscape. We should expect that any meaningful changes in equity market regulations will have large consequences in the routing and execution of orders and the business model of market participants.

SEC Commissioners have been calling for a broad review of our market structure. These market structure questions are eminently amenable to empirical analysis, and any revisions to our trading rules should be preceded by meaningful and objective analysis of economic data. I believe that an encompassing, data-driven, empir-

ical study is an important step to complete before implementing any substantive change to market structure regulation.

I would like to offer two final thoughts. First, I would be remiss if I didn't highlight the need for improvements in the structure of our fixed income markets. The fixed income markets are larger than our equity markets. Investors in corporate and municipal bonds trade using an opaque network of OTC dealers, and retail investors can price spreads of as much as 5 percent. All this happens at the same time that these investors trade in equities, in percentage spread measured in tenths, and in submillisecond timeframes. I hope that in the near future, regulators will turn their focus to the trading structure of these vital markets.

And second, I think it is important that any review of equity market structure include a focus on the best execution duties of brokers that handle customer orders. Existing interpretations of best execution have not kept pace with the changes in market structure and with automated trading. Examples of potential concerns include the effective access fees and liquidity rebates on broker routing decisions and the routing of nonmarketable customer limit orders to exchanges rather than to other venues more advantageous to the limit order.

The Commission should, as part of its review of market structure, revisit their guidance on best execution and consider whether another approach, such as one based on policies and procedures, would be useful in augmenting any change to market structure under consideration.

Thank you for your time this morning.

[The prepared statement of Mr. Sirri can be found on page 60 of the appendix.]

Mr. HURT. Thank you, Mr. Sirri.

Our final witness is Mr. Chester Spatt, former SEC Chief Economist.

Thank you for being here, and you are recognized for 5 minutes.

STATEMENT OF CHESTER SPATT, PAMELA R. AND KENNETH B. DUNN PROFESSOR OF FINANCE, TEPPER SCHOOL OF BUSINESS, CARNEGIE MELLON UNIVERSITY; AND FORMER SEC CHIEF ECONOMIST (2004–2007)

Mr. SPATT. I would like to thank Chairman Garrett, Ranking Member Maloney, and the members of the subcommittee. I am pleased and honored to have the opportunity to present my views at today's important hearing. I served as Chief Economist at the SEC from 2004 to 2007, and I am currently still involved in regulatory issues. I am a member of the Shadow Financial Regulatory Committee and the Federal Reserve's Model Validation Council, among other activities.

There have been dramatic changes in the structure of our equity markets over the last 2 decades, reflecting changes in technology and changes in regulation. Prior to NMS, there was decimalization, which had big impacts on our markets. NMS led to a series of changes focusing on much greater automation in the trading process by its emphasis on fast markets, and partially as a byproduct of NMS and other considerations, there has been a dramatic change in fragmentation. For example, the New York Stock Ex-

change share of trading in its own listings has fallen from 80 percent to 20 percent.

I am pleased that the subcommittee has organized today's hearing to focus on NMS because more generally, I believe that financial regulators should undertake serious retrospective reviews of the consequences of their actions and that, at least in the past, this has not been so much of a focus. I am pleased that going forward, there is more orientation toward that, that the SEC, for example, is signaling its interest in undertaking an experimental pilot analysis with respect to decimalization, although I think my own views are rather doubtful that wider ticks will necessarily meaningfully impact IPO decisions.

One thing that NMS did do is it had the effect of resolving some open issues in its day, which I think provided some clarity to the trading community, and at least some of the big changes that occurred in the aftermath of NMS just simply reflected that there were some rules of the game that were specified, whatever those rules were, and then various platforms felt comfortable to enter.

In the aftermath of NMS as well, New York Stock Exchange specialists no longer retained potentially a 30-second option to send orders to other platforms through the ITS system. So NMS led to, I think, a variety of important changes.

One of the most striking aspects of NMS is the structure of its order protection rule. Orders were protected, but the only orders that were protected were at the top of the book, and I think that is an important point to highlight. So in a way, NMS is a bit schizophrenic, that NMS basically says that orders at the top of the book are deserving of protection, but other orders are not. And certainly, I would not favor providing protection down the book. That would be, I think, even more prescriptive and would add to the technological burden of the rule, but I think it points to a lack of coherence within the structure of NMS, because the protection that is provided is only for orders at the top of the book.

Indeed, I think that points to one of the contributors to fragmentation directly in the rule, because if you have distinct platforms as opposed to a consolidated platform, you get more protection out of NMS, because every top of the book is protected; whereas, if platforms are not separated, they have less protection.

An additional important aspect of NMS is how it integrates the markets. Brokers, of course, have had longstanding best execution responsibility. NMS also has the effect of routing orders to the platforms that potentially would provide the best execution at the top of the book. But in a sense, then, NMS is providing a substitute for best execution, and I think one metric to look to, which has really not been focused on, is whether NMS in fact reduces somewhat the extent of abuse of best execution responsibilities. If NMS were successful, you should now see less abuses of best execution than previously.

An important set of distortions, in my view, with respect to the trading is the "make or take" features of the market, which NMS provides some structure around. There are incentives to collect liquidity rebates and avoid fees for taking liquidities. But I think there are real conflict of interest issues that are raised, and in fact,

I think some interference with best execution, because orders would be isolated where they don't fill most quickly.

Thank you very much very much for the opportunity to speak.

[The prepared statement of Mr. Spatt can be found on page 65 of the appendix.]

Mr. HURT. Thank you, Mr. Spatt.

Now, we will turn our attention to questions from the Members, and I will first recognize myself for 5 minutes.

It seems like everyone agrees that this is an important endeavor that we are undertaking, but I guess the question is, is how is the best way to do that and what information do we need, what information does the SEC need to be able to navigate through this? And I guess my question, and I would like to start with Mr. Campos and then just go down the line, is what data does the SEC currently have that is needed to be able to do this, and what data do they perhaps not have that they need to have to be able to make the right decisions regarding strengthening our equity markets?

Mr. CAMPOS. That obviously is an excellent question. And there is, first of all, a lot of data. My colleagues who are economists and researchers deal with that daily. But essentially, a study of whether investors are getting best execution, as was just discussed, studies as to whether the pricing tends to reflect the best price in the markets, all of that data is there. Are orders being routed from market and trading centers to reflect the best top of the book price? Again, all of those things are data that is available.

And what we don't know, I suppose, are things about whether liquidity is being held back, about whether there are things going on in internalization models. I would argue that the enforcement mechanisms and the examinations have been very robust. But nonetheless, that could be looked at.

Mr. HURT. Okay. Thank you.

Mr. Lofchie?

Mr. LOFCHIE. Thanks very much. I think there is a lot of quantitative data. What I think there needs to be is more focus on qualitative data, an understanding of the motivations of market participants. I think we need to understand why do mutual funds and institutional investors prefer going to alternative trading systems rather than to trade on the exchanges? It is not enough just to look at the numbers. It is important to understand why they find one venue preferable to another, and that will help us understand how rules changes that we will make in the future will affect their incentive scheme.

Mr. HURT. Mr. Sirri?

Mr. SIRRI. I think we all talked about how tricky it is to trade with computers, but one of the good things about that is that you have the data. It is in electronic form to begin with. That is not how it was 20 years ago. So, the SEC has the access to a chunk of that, not all of it.

I think partners in this revision have to come from industry. The street, the broker dealers, the users, they also have data in electronic form. Hopefully, as part of the process that this committee is envisioning, they will cooperate, they will do their own analysis, and they will contribute that data to the public, to the Commission,

so that its analysis can be fruitful and you get a better answer to these questions.

Mr. HURT. Thank you, Mr. Sirri.

Mr. Spatt?

Mr. SPATT. I think much of the data is potentially available because of the electronic structure of our markets. Historically, the SEC was not in a good position to integrate the data from various platforms, given the large number of platforms and the importance of the fine time stamping, and I don't know whether those are still issues going forward.

It seems to me the types of things that one would want to analyze in a serious way are to try to understand, especially the routing decision. It seems to me the routing decision is at the core of the issues. My comments earlier about the "make or take" decision are illustrative of that, but you can think of the routing decision more broadly. I think that is an absolutely essential feature that it is important to try to drill down on. It is also related to issues involving how orders at a higher level are packaged. How does the institutional investor piece out his order? And it is a bit related to best execution, but I think in some ways it is broader.

Now, that would be data that I think typically the SEC wouldn't currently have. That would be data that would be available in the brokerage community or in the asset management community, in effect, how do they put in orders, and then what are the paths by which they execute over time. And I think understanding that would be incredibly helpful.

Mr. HURT. Thank you, Mr. Spatt. My time has expired.

I now recognize the ranking member, Mrs. Maloney, for 5 minutes.

Mrs. MALONEY. Thank you very much.

Professor Sirri, you noted in your testimony that one of the SEC's goals in passing Reg NMS was to promote price competition. With at least 58 different trading venues today, we certainly have increased competition. Some people say it is too much. As you know, many in the markets, including the exchanges, believe that we now have too many trading venues and that the markets have become too fragmented. What is your opinion? Have we reached the point where fragmentation of markets is a bigger problem than competition? Or do you think the markets are fragmented?

Mr. SIRRI. I think if you talked about fragmentation as being anyone's stock can trade in 50, 60, 70 places, yes, they are fragmented. But if you talk about fragmentation being they are insufficiently connected or other people are not able to get the best price across these markets, that is a tougher question to answer.

The computerized trading, the private linkages help integrate those markets together, but the linch pin of it all in the end is the person who sends the order, who has the order to begin with and picks where am I going to trade it. That person has to be smart, that person has to use technology, and they have to figure out, in their routing decision, how to link. So I think while the markets are somewhat dispersed, there exists technology and smarts to bring them together.

Mrs. MALONEY. Okay. So you support NMS? You think it has brought the improvements?

Mr. SIRRI. I wouldn't say I support or don't support NMS. Like all regulation, it has its problems and it can be improved, and I think probably that is why a lot of us are here today.

I think dispersion of market centers was going on before NMS came up. We had separated market centers. NMS created a platform where more of it could happen and it at the same time allowed them to be more connected. I think the empirical studies that you all are calling for will help answer the question you are asking, which is, is it too much?

Mrs. MALONEY. And Mr. Campos, as the SEC Commissioner who voted for Reg NMS, I would like to ask you one simple question. Is the current market structure what you envisioned when you passed it? And if not, what has surprised you?

Mr. CAMPOS. None of us—just like we have 20/20 hindsight, we don't have 20/20 foresight. We were worried initially about whether the connectivity was going to be sufficient and whether it would work.

As Erik Sirri, Professor Sirri has just said, there were many markets already existing at the time that we adopted it. It would be a very arrogant regulator to believe that they can control or should control what the markets will look like in the future. So, the effort here again was to create a situation in which the technology connected and we had a market system. None of us had any idea of how many that would be, whether it would be 20, it would be 30, or maybe it would be 10. But we expected that business models providing service and value to investors would be what would determine how many existed.

I think it is a unique feature of the American system to have competition among markets. And recall that some of these markets produce very positive results. There is price improvement in some of these markets where there is an execution at the midpoint. I will just leave you with that.

Mrs. MALONEY. Thank you.

We certainly have the data elements out there, but they are not really in a way we can use them. And we created in Dodd-Frank the Office of Financial Research, and they have been in existence now for a number of years, and all they have done is proceed to give an LEI, which is an identification to every broker and person in the business, and that seems to me like a waste of time. I think the best data element is the trade itself, and that trade itself is identified with a broker and a firm. Am I not correct? I will just ask Mr. Campos or anybody?

Mr. CAMPOS. Yes. I think getting an execution at a decent price, being able to access the best price, and that can be tested, I think is ultimately the best test of the situation.

Mrs. MALONEY. My time is almost up, and I don't think I have time for you to answer, but I would like back in writing from you, if we were to look at this, and we have the data elements, what would be the best way to look at it? You have much more expertise than any of us because you have lived through it and you have been part of the markets, you study it every day. I think that would be very helpful to us as we look at this.

My time has expired. Thank you.

Mr. CAMPOS. I would be very pleased to do that. I am sure all the other members would, too, on the panel.

Mr. HURT. Thank you, Mrs. Maloney.

The Chair now recognizes the gentleman from South Carolina, Mr. Mulvaney, for 5 minutes.

Mr. MULVANEY. I do have a couple of different types of questions.

Mr. Sirri, I want to follow up on a question. I don't know if I understood the answer to Mrs. Maloney's question, so I will put it to the entire panel. Has Reg NMS led to too much fragmentation within the markets? I think Mr. Sirri said no, but I wonder if that is unanimous amongst the panel?

Mr. Spatt?

Mr. SPATT. I am not so concerned that it has led to too much fragmentation, although it may have led to too much fragmentation in particular ways. It certainly creates some incentives toward fragmentation by the focus on the top of the book in particular, but it is not so much of a concern to me on the broad issue because spreads are substantially down. Before you had a situation where a lot of the market making was occurring in a very noncompetitive way. So it is not a huge concern to me, but this is obviously a first order issue to consider.

Mr. MULVANEY. Mr. Lofchie? Mr. Campos?

Mr. LOFCHIE. I think what I am hearing from all of the panel is that fragmentation per se is not an issue, and that remarkably trades can be executed across markets much faster today than they could be in 1975 or pre-NMS.

I think the real issue is why we have so many markets. Is it because it is serving the interests of market participants or is it because rules incent people to move customer orders in ways that may be inefficient in order to take fees rather than to serve their customers. And I think if we have rules that incent brokers and institutional investors to act in the best interests of their customers, then the market will decide how many exchanges and how many alternative trading systems survive.

Mr. MULVANEY. Does your analysis change if we start talking about the lit versus unlit of these dark pool markets? Do we need to update the regulatory environment to allow them to compete on a more even playing field? Mr. Lofchie?

Mr. LOFCHIE. One of the things that I think we need to look at, again, is the motivation of traders. There is clearly a tremendous incentive of traders, as Professor Sirri said, not to show their quotes on the exchange markets. And I think, given the increase of trading in these alternative trading systems, we need to understand why they provide benefits. Clearly, they do provide a benefit. And I am anxious as to any system that would force the person at the point of trade, the institutional investor, the mutual fund, the pension plan, not to trade in a way that he sees as serving the interests of his investors.

Mr. CAMPOS. Could I serve a caution?

Mr. MULVANEY. Please.

Mr. CAMPOS. The term "dark pools" is used often, and it has sort of a sinister connotation. After all, it is dark. But the reality is that the rules regarding dark pools are very clear. They have to at least reflect the last best price. And often what they reflect is a negotia-

tion, and there is price improvement because they tend—or at least one particular system that I am very familiar with executes at the midpoint, which is a positive for both, and then it is reported to the tape.

So the actual execution and the price that they agree upon is not kept from the market. It is not a secret. And it offers something that is very important to many large institutional investors, which is that they have large block trades to execute, and if they put them in through regular execution situations they have to be shredded or so-called, split up into small. It is very expensive to do that. And so, there is a reason why many of these markets exist. They provide a service that is necessary

Mr. MULVANEY. There is an efficiency that comes from that.

Mr. Campos, I am going to do something unusual. I am going to go off topic, but since we have you here today, I want to ask you about something that just became public this week. It deals with the SEC, it doesn't deal with you individually, but I am curious to know your opinion of it. There was a fairly widely reported paper, I think published by the University of Virginia by two professors out of Georgia, regarding insider trading by SEC employees. Specifically, how they are able to apparently pick better times to sell stocks than the ordinary public and that they apparently, I guess the allegation is, they use information that is inside the SEC on upcoming investigations.

How should we best approach the issue going forward as a committee as we want to focus on possible wrongdoing by the employees at the SEC?

Mr. HURT. Mr. Campos, because we are running up against the votes, is it possible for you to please respond in writing?

Mr. MULVANEY. I would appreciate it. I wasn't aware of the votes. Thank you, Mr. Chairman. Yes, sir.

Mr. HURT. Yes.

Mr. CAMPOS. Certainly

Mr. HURT. And so, if you would please respond in writing, that would be very helpful.

Mr. HURT. The Chair now recognizes Mr. Lynch for 5 minutes for questions.

Mr. LYNCH. Thank you, Mr. Chairman. I would be interested in having the response to the earlier question as well.

This is a great discussion, and the problem at the root of this sometimes—and I know that Congress has been late in responding to this. I think the SEC agreed to take up a study of market structure back in 2010, and that has not happened yet. One of the problems that we have is the pace at which technology changes and the pace at which government changes. We would still have powdered wigs, if we looked good in powdered wigs still.

Meanwhile, technology changes at a breakneck speed. And so in a way, we find ourselves in a reactionary mode in government. We are trying to, in this case, with market structure, respond to the plumbing of these super fast trading platforms and things like that. Oftentimes, we find ourselves trying to catch up, and that has been a real struggle. So maybe there is a way we can, if the SEC gets serious about that, together we can envision a platform that might be able to address all of the concerns that we have.

But let me get to my question. Not only has the volume of dark pools, of trading in dark pools has increased, but also we are seeing some individual stocks where over 50 percent of the trading in individual stocks is going to dark pools, and that is a different issue than people having large trades, trying to move those institutionally without being gamed by some of these other traders.

I know that in the international literature there has been a couple of studies by Australia and our friends in Canada that have looked at the U.S. markets, and they have had real concerns about price discovery and whether our markets are as efficient as they once were. And it is interesting because both of those countries, after studying the United States, are implementing measures to preserve their price discovery process. Both are implementing "trade at" rules to try to preserve the ability of large trades to be done in the dark but also requires most other trades to be routed to the best price on the transparent markets.

What do you think that our next step should be in terms of moving towards markets that move trades back onto these lit markets, lit exchanges, public exchanges, what do you think that the greatest incentives we could give to move some of these trades back onto, again, lit markets, public markets, NASDAQ, the New York Stock Exchange, so that the risk of—well, the risk of something happening in the opaque markets is reduced?

Mr. CAMPOS. Is that directed to me?

Mr. LYNCH. Yes.

Mr. CAMPOS. Thank you for the question; it is very thoughtful.

First of all, I think you need to ask yourself, and the whole committee does, is it really a worthwhile goal to want to increase the volume on the exchanges per se, is that a real and a worthy goal? I submit to you that if orders are being routed correctly, if the connectivity is working and investors are getting the best price at that particular instant, that in itself is a worthy result. And the fact that volume is now dissipated may or may not be a negative.

Mr. LYNCH. Just to interject here.

Mr. CAMPOS. Sure.

Mr. LYNCH. With the rebate system, I am not sure I can tell whether the customer—in the dark pool situation. So I don't know, I don't really have a window into that, or government doesn't have a window into that to determine, with the speed of these trades, with the offering of rebates and other considerations, whether the customer is getting the best available price. I know that is the idea.

Mr. CAMPOS. Right.

Mr.LYNCH. But we have seen in other situations where there have been opaque markets, that whatever advantage a trader can get, they will take. That is just the way it works.

Mr. CAMPOS. I know there is a time issue, so I will make it very brief.

Mr. LYNCH. Yes.

Mr. CAMPOS. Again, it is a great question. One should look at it. I believe that many so-called dark pools and ATS's, if they offer price improvement, that is what has been used in Australia and other places to allow sort of a license to be in that particular—

Mr. HURT. Thank you, Mr. Campos.

Mr. LYNCH. I yield back.

Mr. HURT. And I apologize to the witnesses for this time constraint.

What I would like to do, if there is no objection, I think we probably have time to squeeze in two more questions, one from Mr. Ross and then one from Mr. Scott, and then we can adjourn temporarily to vote and then we will come back. And I apologize to the witnesses and to the audience for that and to the Members.

But the Chair now recognizes Mr. Ross for 5 minutes.

Mr. ROSS. Thank you, Mr. Chairman.

Commissioner Campos, do you feel that Reg NMS is the reason we have so many trading centers?

Mr. CAMPOS. Not per se. I think it accommodated it. Remember, Reg NMS was intended when we did it to allow the markets to work in the manner that markets work.

Mr. ROSS. So they have naturally evolved, in other words, irrespective.

Mr. CAMPOS. Exactly. And there were already many, many centers when NMS was—

Mr. ROSS. And that is not a bad thing, is it?

Mr. CAMPOS. I don't think it is a bad thing at all.

Mr. ROSS. Mr. Lofchie, you spoke earlier in your opening statement about the monopoly of the NYSE back in 1975, and I think that some would say that back then we had two dominant exchanges, the NASDAQ and the NYSE, and they had high barriers to entry. Back then, some would argue, it was simpler and safer. Do you think that is something that we should consider going back to? Is it even possible?

Mr. LOFCHIE. It is certainly not possible. It was clearly simpler. I don't know that it was safer.

Look, there is no question that today's markets, as disbursed as they are, in fact, I think provide investors much better protection, that all of these various markets work together more quickly than the NYSE did back then. So I think we have to deal with the markets that we have and the technology that we have. There is no turning back.

Mr. ROSS. And technology has been good, but retail investors have been a little bit hesitant, have they not, because of technology, when you look at how technology has permeated so many areas of our world, whether it be medicine or transportation or anything. And so when you have a flash crash occurring, would you say that technology has been somewhat of an impediment, although a benefit?

Mr. LOFCHIE. I think overall, it has been an extremely large benefit. Again, I think our ability to track information, to know whether investors are getting the best price, to link markets, if you compare the markets of today to the markets of 1975 or of pre-NMS, there is no question they are far better. On the other hand, when something goes wrong, it goes wrong big, and I think that is something that needs to be focused on. I think the SEC, with some of the moves to start markets, has made moves in that direction.

Mr. ROSS. In your opening statement, I very much enjoyed your discussion semantically about dark pools and protective coves versus naked bazaars. Is this more of an issue of semantics? We have probably the deepest and most transparent equity markets of

anybody. And we look at dark pools, and is the first problem that we have one of semantics?

Mr. LOFCHIE. I think there is a risk that we judge markets by their name rather than by the service that they provide. And it does worry me that when mutual funds and institutional investors are electing to trade on what we are calling a dark pool, that we are saying, oh, that is not good, because we don't like the name of it.

Mr. ROSS. The dark pool. But it does help retail. It helps the markets. It is a necessary tool, wouldn't you agree?

Mr. LOFCHIE. Clearly, the way that retail investors for the most part trade in the market or participate in the market are through these institutional entities like mutual funds and like pension plans, which very much avail themselves of dark pools.

Mr. ROSS. Mr. Sirri, with regard to market data, and I think Mr. Lofchie's earlier testimony about more qualitative analysis of the data as opposed to just a collection of quantitative collection of data, do you feel that the SEC is doing that now and using it effectively? Are they doing more quantitative collection as opposed to qualitative?

Mr. SIRRI. I think relative to, say, 5 or 10 years ago, the SEC has improved on both fronts. Their quantitative data use is better than it has been, they have tooled up in that area, they have expanded the group that does such analysis, it has many more people in it now and it has more skilled people than it used to. That has improved.

As to your question about qualitative data, I am not as well informed about that. I would expect they have. That necessarily involves outreach, that involves talking to people and understanding that.

Mr. ROSS. Right. It is more than just collection.

Mr. SIRRI. Absolutely. And I will tell you from having been there, there is usually no shortage of people who want to walk in the door and explain their views to you. So unless that has changed in the last few years, I expect they are hearing their views.

Mr. ROSS. One quick question, and, Mr. Spatt, I will give this to you. A recent Wall Street Journal article states that many Wall Street executives point to extreme complexity created by Reg NMS as the cause for technical glitches. Has the combination of technical complexity and more exchanges created an environment where glitches are more likely to occur?

Mr. SPATT. There seem to be more glitches in recent years. Inherently, to the extent that the platforms need to interface with each other, that is maybe part of the source of a glitch. But I think one also has to assess the glitches from a broad perspective in terms of the everyday performance of the market.

Mr. ROSS. Higher volume, higher frequency may lead to more glitches.

Mr. HURT. Thank you.

Mr. ROSS. Thank you.

Mr. HURT. Thank you, Mr. Spatt.

Mr. ROSS. I yield back.

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

The Chair now recognizes Mr. Scott from Georgia.

Mr. SCOTT. Thank you very much.

I want to go back to this issue of the dark pools, because I think we need to understand my point and the concerns about the fair competition. We, in Congress, amended the Securities Exchange Act to add Section 11A, which was to foster fair competition.

Now, it is important for us to understand what these dark pools are. I am not casting a bad light on them. But what these dark pools are, they provide institutional, large institutional investors with anonymity in the equities market with the option to execute these large orders without identifying either themselves or the location of trade to the consolidated market data, and such secrecy allows market participants to prevent other traders from pricing in that arena. Therefore, this concern is certainly a legitimate concern, especially now that 40 percent of the average daily volume is in the dark. And with the increase in liquidity fragmentation—13 equity exchanges, 45 dark pools—many, many of our investors are raising concerns.

So my question is, don't each of you agree that order competition as a result of this has decreased and that the SEC should be looking for ways to rebalance this? Please, each of you.

Mr. SPATT. I don't agree. I agree that the issue of transparency is an important one, but I also feel that the institutional investors, how they manage their orders to some extent is part of their intellectual property. If we were to, for example, declare that we would not allow the dark pools to operate, to some extent they are going to follow very different tactics. They are going to presumably then shred their orders to a much greater degree. There is a balancing act.

Mr. SCOTT. That is what I am asking for. I am not asking that we do away with the dark pools. I am just simply saying that there should be an examination for a more fair competition within that.

Mr. SPATT. I am very comfortable with the idea of studying the issues, but I think it is important to keep in mind that there is a bunch of balancing, and that to some extent, if the rules were to change, institutional investors will change how they respond to those rules, and I think it is important to keep that in mind. And I also think it is important to keep in mind that even for dark pools, there is post-trade price reporting, for example, that is required of the dark pools as well.

Mr. SCOTT. Mr. Sirri?

Mr. SIRRI. I think if you wanted to create an environment where there was more transparency in dark pools, Congress could do that and the SEC could do that, incrementally if they chose. For example, you could cause the dark pool to report when a trade occurred in that particular dark pool. That is not done today. A dark pool is not identified as such.

But as to what Mr. Spatt said, I would agree with it, which is if you choose to do that then traders, as they use that particular dark pool, will change. They will do something different. Net-net, is that better or worse? I can't tell. But I think part of what gets at the answer to your question and to Mr. Lynch's question will be a comparison of how well did a particular trade do on an exchange that was lit and how well did that same trade or an equivalent trade do on a dark pool that was dark?

Mr. SCOTT. Good.

Mr. Lofchie?

Mr. LOFCHIE. I think one of the issues that you implicitly identified, Representative Scott, is the fact that large traders may move the market. And I think the concern that all of us have, and I think likely share with you, is that when mutual funds and pension plans trade in large volume, if they are going to do that in a fully exposed manner, are they going to move the markets against them and will that end up hurting retail investors indirectly.

Mr. SCOTT. Thanks.

Mr. Campos?

Mr. CAMPOS. Representative Scott, thank you. That is a very thoughtful question.

The issue here really is, can you stop human nature? People since time immemorial have made deals outside any market system. If you own stock and I own stock, we can trade it without any market. And so what you are hearing is essentially that there is a need for large investors to do their trades cheaply, which helps pensioners, which helps retirees, and they need to save money on executions and they need to get the best price. So these dark pools serve that purpose very well.

Mr. HURT. Thank you, Mr. Campos.

Mr. SCOTT. Thank you, sir.

Mr. HURT. And I think, unless there is any objection, Mr. Huizenga from Michigan has asked to be recognized for 5 minutes. I think we can work him in before we have to run to votes, so I am going to recognize him for 5 minutes.

Mr. HUIZENGA. Thank you, Mr. Chairman. I promise to try to fold time and space here and make it as fast as possible so we can get to votes.

I was going to start by asking, and I think we have explored this quite a bit, how the rules and regulations may have pushed, not forced, but maybe pushed some of these trades off of the exchanges and into these dark pools. I think it has been explored quite a bit, and Mr. Lofchie I think asked a key question: Why are they going to these alternatives?

And I am going to go to another dark and ominous place, high frequency trading, or I think as some of my friends in New York call it, automated trading, much less ominous than the high frequency sounding.

But, Mr. Sirri, talking about mandating a focus on price and speed in executing trades, I am curious about your take on how Reg NMS has impacted equity markets and the investors who participate in these markets, and has it led to some of these high frequency tradings, HFTs, or is that separate in your mind?

Mr. SIRRI. I think certain provisions of Reg NMS certainly contributed to that, most specifically the ones that required private market linkages. Before Reg NMS, the linkages between our exchange markets was very primitive. An exchange like the New York could hold an order for 10, 20, 30 seconds and not interact with that.

Today, the exchanges have to be automated, those automated exchanges are protected, and they route orders between each other on high-speed computer networks. This has gone on to the point where

if you are serious about trading in these markets, you need to collocate your computers, you need to trade physically close to your market center, because like travel time, as fast as that is, that is an important determiner.

Mr. HUIZENGA. I know there was a story not that long ago about the use of some of the military technology on communication with lasers now being utilized. I am trying to get my head wrapped around fractions of nanoseconds and the amount of information, the multiple terabytes that are being exchanged sometimes.

But does anybody have a concern with the speed, what has occurred? Mr. Spatt?

Mr. SPATT. Well, not necessarily a strong concern. It is surprising, though. I share your at least implicit surprise. I think what it is pointing out is that the various intermediaries must feel that these are profitable investments, and that despite incurring the costs for these investments, they are still able to make money as intermediaries, and I think that is important to keep in mind.

Mr. HUIZENGA. Does anybody care to address what equity markets in Europe or Asia have rules equivalent to Reg NMS, how do these markets perform compared to the United States, and are there any differences in performance in part attributable to Reg NMS? I would love to hear about Canada as well. As Chair of the Inter-Parliamentary Group on Canada, we are working on a trip up there, and would love to have this conversation with my Canadian friends.

Mr. SIRRI. I am not sure I can speak to Canada, but I can talk generally about, for instance, Europe.

Mr. HUIZENGA. All you have to do is add an "eh" on the end of the sentence and you are good.

Mr. SIRRI. There you go.

Our markets are quite integrated relative to, say, the European markets generally. So, for example, as primitive as it sounds, they won't have an integrated quote across all their pan-European market centers. They won't even have a synchronous clock across those centers. We take for granted that all our market centers know what time it is down to a millisecond. That is not necessarily true in a pan—

Mr. HUIZENGA. Meaning the DAX and the CAC and everybody else aren't necessarily on the same page?

Mr. SIRRI. That is not necessarily integrated in that same way. So in that sense, we have a much higher degree of integration in our markets.

Mr. HUIZENGA. Do you see them going in that direction?

Mr. SIRRI. I think there are different issues there. They have different incentives and they have different governing principles. They have MiFID and certain other things that govern that. I am not sure I am up-to-speed enough to tell you, but I don't think I have seen big movements.

Mr. HUIZENGA. Have they not done that because there is a fear that it may put them at a disadvantage? I'm sorry, Mr. Campos, I think you were—

Mr. CAMPOS. No. I was just going to add that if you are interested, I believe in Europe there is more of a protection of their particular market. It is viewed as a national asset. As we know, their

governments protect major industries, major businesses. Germany has a big interest in the Deutsche Borse, and the U.K. in the LSE.

But in addition to the difference that Professor Sirri just mentioned, clearing and settlements in Europe is a private matter. It is not a utility like it is here in the United States essentially. So you have additional costs to trade. This is why the U.S. markets are—one of the reasons, among many, that they are much cheaper. So, there is a big difference in that world.

Mr. HURT. Thank you, Mr. Campos.

The subcommittee will now stand in recess, and we will get started again as soon as we can. Thank you.

[recess].

Mr. HURT. I am going to call the subcommittee to order. Without objection, the Chair is authorized to declare a recess of the subcommittee at any time. Would the witnesses please return to the table?

I want to again thank you all for your appearance today. I think the ranking member is here. I don't think she has any other questions. I might just kind of wind up with a final question and ask for each of you to sort of comment on it. As you know, SEC Chair White and her fellow Commissioners recently supported the need to review equity market structure. What ultimately, from their standpoint and from ours, should the goal of that review be? And if you wanted to just kind of wrap up with your thoughts on that question, Mr. Campos.

Mr. CAMPOS. I appreciate the question. Thank you for the question.

I think that, as we began, and in your remarks as well, the caution is not to throw the baby out with the bathwater, if I can use a common phrase. I think technology is an issue. Technology has moved faster, quicker, in ways that no one has foreseen. And I think the discussion about speed in trading is a legitimate issue to discuss. That shouldn't be confused with structure and whether we have competition appropriately among markets and among the orders. And I think the issues that technology has brought, the flash crash and other instances like that, may have to do with plumbing and may have to do with better connections and that sort of thing, and that is a separate review.

Mr. HURT. Mr. Lofchie?

Mr. LOFCHIE. One of the interesting issues, I think, for the regulators is determining whether we need a more rules-based system or a more policy-based system. And I think one of the issues that has been raised is the difficulty of regulation keeping up with technological advancement. I think the more that we have a rules-based system, really the more difficult it is for the law to keep up with technology. And I think Professor Sirri has raised the possibility of going to a more policy-based system, and that might be one that in fact proves more flexible in keeping up with technology.

Mr. HURT. Thank you.

Mr. Sirri?

Mr. SIRRI. Your question was about the goal of searching for these. I think the goal would be to learn as much as you can from all sectors and synthesize it before you make your decision. Sectors here are investors, they are brokers, they are market centers. You

learn quantitative things, you learn qualitative things, you look at data. Then you put it together in a way that in fact many other people can't, because there are a lot of people who see pieces, but few people see it all. The SEC has the potential to see much more than anyone else. Synthesize it and then use that to inform your regulatory choices after you have synthesized.

Mr. HURT. Great. Thank you.

Mr. Spatt?

Mr. SPATT. I think the review in part should try to assess what have been the impacts of the major regulations from the past, including NMS and decimalization, what have been the broad impacts of these, and to what extent do the regulators feel that there are distortions in the routing process. Especially in an environment where there are as many platforms as there are, the routing decision is absolutely central to the competitive process. And I think trying to drill down on that in a variety of ways has implications for understanding some of the detailed rules, like the rules about maker-taker, it has implications for the interface between NMS and best execution.

I think understanding the decision process by which firms route orders seems to me an absolutely central issue, and it seems to me potentially at the heart of the overarching theme. I think the regulators want to try to learn as much as they can. There is a wealth of data. And I think by putting the right lenses on, there is the potential to learn.

And I think the regulators also ought to step back, and following on the theme of some of the prior witnesses, the regulators should step back and try to identify what are the objectives and goals and try to lay those out and potentially maybe try to consider pulling back from as prescriptive a set of rules as we currently have.

Mr. HURT. Great. Thank you.

And with that, I will yield back my time. And I am pleased to recognize the gentleman from California, Mr. Royce, for a period of 5 minutes.

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

I wanted to ask Mr. Sirri and maybe Mr. Lofchie on order protection, can you give us your best guess on what the market would look like without an order protection rule? Would markets be less connected, and would there be fewer or would there be more trading venues? What would be the evolution?

Mr. SIRRI. Those are the hardest kind of questions to answer, you change one thing and then what does the world look like? And the reason why they are hard to answer is because I have to tell you what the banks, what the brokerages would do next with that. It is hard to predict.

I think if the world were to come to pass as you suggest, you put a lot more weight on the brokers' obligations. For example, since there is not an automated way to protect certain quotes, then brokers are going to have to do that on their own. Certain things might speed up, you might get even faster trading in some ways. But I think to the extent that you are thinking about a world where that might actually happen, you would probably have to make some other changes to go along with it, because that is, of

course, just one piece of what NMS provided. So I wish I had a better crystal ball, but it is just a tough question.

Mr. Royce. Mr. Lofchie?

Mr. LOFCHIE. I am going to be bolder than Erik, but I feel comforted that he said this was a hard question. My guess would be that there would be fewer markets and that you would—

Mr. ROYCE. There would be fewer exchanges. Instead of 15 exchanges, there might be—

Mr. LOFCHIE. I think the order protection rule provides some incentive to split orders among markets rather than concentrating them.

Mr. ROYCE. Yes.

Mr. LOFCHIE. I appreciate Professor Sirri's remark that you really are guessing at the motivations of participants, but I think that is the challenge that the SEC faces, is to anticipate—

Mr. ROYCE. So this is propping up some of the smaller exchanges, presumably the existing structure that otherwise, given the efficiencies, might be collapsed. Is that your—

Mr. LOFCHIE. I think that would be my hypothesis.

Mr. ROYCE. Yes.

Mr. LOFCHIE. And, again, I think it is really about anticipating how rule changes would affect the markets.

Mr. ROYCE. And that takes me maybe to the next question. As we look at the issue from 30,000 feet, you have investors seeking to purchase a product in a market. Required in every one of those transactions is an intermediary, a broker has to be involved in that transaction.

So, Mr. Sirri, your testimony notes that it is important to have this factor of the responsibilities of brokers that handle customer orders and their best execution duties, and what does that best execution mean for the end investor? That is who we are focused on here. And what should the Commission look at in this space when considering the responsibility of brokers and ensuring the end investor receives the best experience?

Mr. SIRRI. The reason why that duty, the best execution duty, is important in securities markets is because individual investors in particular can't tell how well they are being treated. Mom and pop, when they place an order on their screen, they don't know whether they should be trading at 20, 20.01, 20.02 or 20.03. They just don't know. They don't have the information.

That duty confers upon the broker the obligation to act in the interest of the customer whose order they are handling. Hence, it becomes more important the less sophisticated the investor is. So the Commission has always used the duty of best execution to help foster the interests of individual investors when they can't monitor things for themselves. I think it continues to be as important as it ever was, if not more important today.

Mr. ROYCE. So my last question would be, then, what is so complex about the current system, other than there being so many trading venues, other than there being so many exchanges, and how does this complexity actually affect the average investor?

Mr. SPATT. The complexity, I think, comes from many sources. There are a whole range of different types of investors with different business models, intermediaries trying to have their own

business models that accommodate the needs of different types of investors. And obviously, we put those together. At a high level you see this about exchanges and platforms without exchange obligations, you see this with respect to dark pools, you see a whole range of types, and then they are interacting.

And I do think that NMS has made this trading environment more complex because of the obligation to hunt for liquidity across the tops of all of these vehicles.

Mr. ROYCE. Let me, if the chairman would indulge me, I know Commissioner Campos wrote about this at one point. If I could just finish up with your observations, Commissioner?

Mr. CAMPOS. Thank you. If we are talking complexity, as has been said, complexity comes from many sources. And it is almost like fighting the wind. It is going to keep coming, because you have many different types of consumers, let's just think of it in another context, and you have a lot of different people who want to sell consumers.

So I would caution that reducing complexity in and of itself should not be the goal. Instead, fairness is the goal. Is the average small investor, for example, getting almost all the time the best price at that particular instant? If you let things like that guide you—and I know you have a great staff and you think about these things deeply—but if you let principles like that guide you, you will get through this complexity and you will be able to essentially do the proper analysis, which I know you are going to do.

Mr. ROYCE. Thanks, Commissioner, and thanks, panel, very much.

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

The Chair now recognizes Ranking Member Maloney for a period of 5 minutes.

Mrs. MALONEY. I would like to hear your comments on what you think caused the flash crash and the 3-hour stall in NASDAQ and what you can do to correct that.

And one of you mentioned the churning of selling stocks all over the place in order to generate fees. I think that was you. Mr. Lofchie, in your statement, the fear of churning or moving stocks around just to get fees? One of you talked about that.

Mr. LOFCHIE. I think I expressed a concern, Representative Maloney.

Mrs. MALONEY. Yes. And I would like to hear more about that.

And lastly, in reading one of these news articles, they looked at a $2.5 million transaction for stocks, and the broker, they tracked it, the broker offered to buy 750 million shares of stock in order to hide the fact he was buying 2.5 million, and the author questions how that is going to distort the market, trying to hide what they are doing.

So, any comments from any of you on those four questions? Thank you very much. It was very insightful and it was wonderful to have so many well-informed people speak to us today. Thank you.

Mr. SPATT. I will try to take on some of the questions, but not all of the questions.

On the issue of why we have these glitches, I think there are a range of reasons. To some degree, the so-called fat finger where one

trader makes—one trading firm makes a big error, like being off by a zero or maybe two zeros, this has been at the root of some situations, and then as it transmits through, then the market participants, they think that it is real information and then so people react to that in a major way. This has been at the root of some of the glitches.

I think to some degree, even in the flash crash, this was there. In the case of the Knight fiasco, I think the problem was they were responding to what they perceived to be a change in the rules on the NYSE, and on the first day that those changes in rules got rolled out, they started running their modified procedure against that, but without having the opportunity to pretest it, and then further reinforced by they didn't have a kill switch to stop things.

So I think the stories for the glitches differ across situations. I do think that when you have many different platforms, a problem at one can feed into the others. In the NASDAQ case, it was actually in the key information channel, the SIP, and ultimately that is kind of a unique thing, but that kind of brought much of it down.

With respect to your final question about the firm wanting to trade a couple million shares but then scales it up to a couple hundred million shares to try to hide its intent, this is actually a question I have thought about a lot in recent weeks. I think it is a difficult question, because the party that has a couple million shares to trade does seem to me to have a legitimate interest in not wanting the markets to immediately figure out what it is they are up to and have their investors squeezed by the other side of the market. So it tries to create what in my discipline we sometimes might call more of a randomized or mixed strategy. But I was struck in this example by how off the charts, then, the scaling up was, but it does seem to me it started from an investor trying to solve a legitimate business problem, but then clearly they pushed the envelope on it. But it seems not obvious to me where I would ultimately want to come down on that.

Mr. SIRRI. I think the one thing I would say to that last point, Congresswoman Maloney, is that as technology changes, the form of manipulation can change, and so your interpretation of what you call manipulation has to change along with it. You pointed to something that you probably couldn't have done 10 or 15 years ago. You can do it today, and I think the way you track manipulation, the regulator tracks manipulation has to change.

Mrs. MALONEY. And what about the churning for fees?

Mr. LOFCHIE. I think the regulators need to look at not only the high profile issues, such as high frequency and algo, they need to look at more subtle issues like market data fees and to ask whether those kinds of fees are altering the way investors trade to alter the order routing decisions, as Professor Spatt has said.

Mrs. MALONEY. Thank you. My time is up.

Mr. HURT. I would like to thank today's witnesses for your testimony.

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 ob-

jection, Members will have 5 legislative days to submit extraneous materials to the Chair for inclusion in the record.

With that, this hearing is adjourned. Thank you.

[Whereupon, at 11:57 a.m., the hearing was adjourned.]

A P P E N D I X

February 28, 2014

Testimony Concerning
Equity Market Structure: A Review of SEC Regulation NMS

Roel C. Campos

Before the House Subcommittee on Capital Markets
and Government Sponsored Enterprises

February 28, 2014

Chairman Garrett, Ranking Member Maloney, and Members of the Committee:

Thank you for inviting me to testify today concerning the important developments in the equity markets and Regulation NMS.

I am a former Commissioner of the Securities and Exchange Commission (SEC), having been confirmed twice by the U.S. Senate, serving from 2002 – 2007. I was one of the three out of five votes cast by the SEC Commissioners in favor of passing Regulation NMS. I am a now a partner with the international law firm of Locke Lord LLP, where I am head of the Securities Enforcement and Regulation Practice.

Reflecting on landmark regulations of our equities markets over the years – from the Securities Exchange Act of 1934, to the Maloney Act of 1938, to the 1975 Acts Amendments, the Order Handling Rules, to new types of markets, to the initiation of trading in penny increments, and to Regulation NMS – I am reminded that, indeed, change is constant.

The very difficult concerns that existed when we considered the adoption of Regulation NMS exist today, although the issues may be manifested differently. For example, today just like in 2005, our equity markets experienced sweeping changes driven in large measure by developments in technology and globalization. As such, I commend the Subcommittee on Capital Markets and Government Sponsored Enterprises for recognizing the ever-present need for a regulatory structure that accounts for developments in our markets. Certainly, all major regulations need periodic review to assess suitability to the changing landscape.

Amid the ever-present evolution of our equity markets, the guiding principle for the SEC as formulated by Congress has remained constant: to provide fair and efficient capital markets. Embedded in that principle is the theme that small and

retail investors not be disadvantaged in a meaningful way by the professional class of traders and institutional investors. The U.S. markets are unique in the world in having an active participating retail class of investors, which add substantial liquidity and in turn attract investors from all corners of the globe. The concepts in our securities markets endure – the various trading venues are places that bring together the orders for securities of multiple buyers and sellers and use established, non-discretionary methods under which such orders interact with each other. As a Commissioner, I held steadfast on one overriding objective – the protection of all investors. As the head of one of the largest sovereign wealth funds once told me, "We buy equities in the U.S. markets because they are fair, efficient, and transparent, and I know that if something goes wrong, we have the protection of American law that will treat us fairly."

When originally considering Regulation NMS, I realized that it was foolish to predict the future and also that it would be impossible to determine in theory what would be the best business model for the markets. Instead, the objective became to establish a framework for the U.S. markets in which fair competition and not regulators would determine the winners and losers and the ultimate market structure. Indeed, the U.S. markets are also unique in that competition exists in both among trading centers (exchanges and other platforms such as ATS's) and separately among orders as well.

These principles have served our equities markets well. Our securities markets continue to be the envy of the world: we have the deepest most liquid markets, and most studies conclude that the U.S. markets provide the lowest costs to trade.

Today, there is criticism in some quarters that Regulation NMS is a principal force driving the capital markets toward a complex, fragmented market structure where priority is given to speed over liquidity and technology over human judgment. The equity markets constantly evolve, as does the regulatory structure. Rather than a "which came first" debate, the SEC's oversight has focused on the appropriate regulation for the evolving equity market structure. And, it should continue to do so.

With Regulation NMS, we dealt with a decades-long trend in which market structure was evolving from manual trading to a market structure dominated by automated trading. Nostalgia for a simpler world should not be a factor. There were many problems and unfairness to investors in the prior market world that was largely concentrated in one exchange.

Prior to Regulation NMS, the lack of consistent inter-market trading rules for all NMS stocks had divided the equity markets into halves: a market for exchange-listed stocks and a market for Nasdaq stocks. For historical reasons, including the history of the NYSE as an auction market and Nasdaq as a dealer market, these stocks traded in quite different regulatory structures. Exchange-listed stocks were subject to the Intermarket Trading System, or ITS, rules. With Regulation NMS, the Commission took a critical step forward in adopting a comprehensive set of reforms designed to strengthen and modernize our national market system.

Today, manual trading has gone the way of the horse and buggy. While the U.S. market share in *trading* is no longer concentrated in one market, our markets are linked as one *national market system.* The fact that executions can occur in any of over 60 platforms and exchanges does not mean that the markets are fragmented. After all, these platforms are linked and connected electronically – creating what Congress intended: a national market system, where the best price can be found for investors in fractions of a second among all the trading centers. That has been a good result. Assuring consistent inter-market trading rules was the right decision then, as it is now. Of course, particular decisions in Regulation NMS, such as the access fee and others, deserve a reevaluation.

In my view, Regulation NMS has had largely positive effects on equity market structure. Reviewing market structure is appropriate, but the old adage "Do no harm" comes to mind. Accordingly, in any review of markets, Congress and the SEC must be guided by accurate and comprehensive data. As I learned in my service as a Commissioner, the SEC and Congress must always consider the source of information and remember that existing businesses will seek primarily to justify their business model and to disadvantage competitors. Some have suggested negative unintended consequences from Regulation NMS, which certainly require careful study and consideration by Congress and the SEC.

Such a study should carefully isolate engineering problems, as distinct from issues with regulatory policy. For example, while my computer crashes more often than I like, I have not abandoned my PC in favor of the typewriter I used earlier in my professional career. We should work to resolve engineering problems imposed by new technology (flash crash and other technology failures), and mitigate potential damages with appropriately tailored regulatory policy.

I also advise caution in assuming that trading systems known as "dark pools" are per say a bad thing. Remember that the competitive markets, not regulators, have determined that such platform systems provide valuable services. First of all, there

has always existed so called internalization – where brokers use their in house inventory to fill orders from their customers in their back offices outside exchanges. Regulation NMS reflected reality and the demand by large investors to lower their execution costs and not to reveal large unexecuted orders to the market – where front running could occur and the share price be disadvantaged. Regulation NMS required that internalization and ATS's reflect the last best price and then report executions to the Consolidated Tape. Therefore, today these executions are not really dark.

ATS's and dark pools offer many benefits that investors desire: the ability to trade large block orders without moving the market and offering in many cases price improvement. One particular ATS model regularly executes at the mid-point between bid and offer, providing substantial price improvement. Remember that institutional investors that use so called dark pools capture lower costs and price improvement for pensioners and beneficiaries, assisting in achieving retirement dreams.

Again, I am certain this Committee and its distinguished members will study carefully the new challenges for the U.S. markets, while keeping in mind the many advantages and benefits that today's markets convey to investors.

Thank you again for inviting me to speak to you and provide my views.

Steven Lofchie

Cadwalader, Wickersham & Taft LLP

WRITTEN TESTIMONY

HOUSE OF REPRESENTATIVES COMMITTEE ON FINANCIAL SERVICES
SUBCOMMITTEE ON CAPITAL MARKETS AND GOVERNMENT
SPONSORED ENTERPRISES

HEARING ON

"Equity Market Structure: A Review of SEC Regulation NMS"

February 28, 2014

Chairman Garrett, Ranking Member Maloney, and members of the Subcommittee, thank you for the opportunity to testify before you today at this important hearing. While much regulatory attention has been focused on the derivatives markets, it is, in fact, the equities markets that are the foundation of our financial markets. By reviewing and questioning the assumptions behind the regulatory policies that govern these markets, regulators can develop rules that will advance the national goal of making the markets as fair, efficient, deep and stable as is possible.

My name is Steven Lofchie, I am a Partner, and Co-Chair of the Financial Services Group, at the international law firm Cadwalader, Wickersham & Taft LLP. I am here in my personal capacity and not to represent the views of Cadwalader or any of the firm's clients. Below I have provided background on both the firm and myself.

Background on Cadwalader and Steven Lofchie

Cadwalader, Wickersham & Taft LLP, founded in 1792, is proud of more than 200 years of service to many of the world's most prestigious institutions. Our rich history and participation in many significant social, economic, and legal issues in the United States enabled us to become one of the world's most prominent law firms, advising clients of all types. We represent major corporations, financial institutions, both buy- and sell-side, as well as governmental entities, including the U.S. government, which we represented in the restructuring of Chrysler LLC and General Motors Corporation. The International Financial Law Review named Cadwalader one of the best Financial Regulatory Practices in the United States for the last two years (2013 and 2014), which reflects the depth and breadth of our regulatory practice.

I am the head of the Financial Services Group at Cadwalader and lead our financial regulatory practice. I am the author of *Lofchie's Guide to Broker-Dealer Regulation*, which is regarded as the standard treatise on the subject. In addition, as the head of the regulatory practice, I am responsible for the publication and editing of a daily regulatory newsletter that goes out to over 10,000 recipients, including many here in Washington. I am also responsible for a legal website, the Cadwalader Cabinet, designed for use by financial service and compliance professionals, that has been endorsed as an information resource by two former Chairpersons of the SEC, two former Chairpersons of the CFTC, and numerous others involved in financial regulation.

Overall Theme: Questioning Assumptions

My fellow panelists include two economists who have extensive experience in the quantitative analysis of trading. All of my co-panelists have tremendous regulatory experience. My goal is to contribute a different perspective. It is to set forth questions, based on my experience advising market participants, that should be addressed by economists and regulators as they undertake to re-examine the rules.

If the assumptions underlying the rules that govern the National Market System ("NMS") are not correct—and I think that they are, if not wrong, at least unproven—then the NMS Rules themselves may be wrong, which is to say, damaging to the interests of investors, both retail and institutional.

I want to be clear. All of these assumptions that underlie NMS are well-intentioned. They share a common tendency: they sound true. The very fact that they sound true, however, can make it seem unnecessary to test whether the underlying assumptions are, in fact, true.[1]

Same Old, Same Old (Not)

To start, I question whether we should interpret Section 11A of the Securities Exchange Act, which provides the statutory basis for the adoption of the rules governing the National Market System, in the same manner as it was interpreted by the original adopting Congress. Put differently, should we respect "original intent"?

Section 11A is written so as to express goals that sound timeless—fair competition among firms, the practicability of executing orders in the best market, the opportunity for orders to be executed without the intervention of a dealer. Hearing that very elegant language, it is easy to think that the drafters of the 1975 language anticipated our current circumstances with such foresight that we have only to follow in their footsteps. Notwithstanding that the language of Section 11A may ring of eternal truths, we should be mindful that the markets that Congress and the SEC oversaw in 1975, at the time of the adoption of Section 11A, bear little resemblance to our current markets.

In 1975, the New York Stock Exchange had a practical monopoly on the trading of stocks in the United States. Trade speed was measured in minutes, not in milliseconds. Every trade was at risk of being picked off by the specialist. Spreads were in eighths, at a minimum, so a round trip purchase and sale cost a quarter. The NYSE formed something of a private club that served to regulate its members, but was largely closed to outside forces. Section 11A was adopted to deal with the problems faced by the market at that time: a monopoly on trading held by one exchange, slow manual executions, specialist profiteering based on knowledge of limit orders, spreads that were extremely high taking into account inflation and the dollar spread in today's terms between a bid and offer, and limited access by non-NYSE members to the bids and offers available on the exchange floor.

The problems of 1975 have in large part been successfully addressed, but only to be replaced by new ones. Today's problems are not those of a monopoly, they are of fragmentation; they are not of sloth, they are of speed; they are not of specialist profiteering, they are of the lack of strong incentives for firms to become market makers; they are not of over-reliance on the individuals who are specialists on the floor, they are of technology breakdowns; they are not of a private club of exchange members, they are of regulating competition between exchanges and their former members.

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[1] As Chair White has said, there are many assumptions about market structure that seem almost "accidental" and can be a result of "long-standing market practices"—and I would add: regulatory habits. I further agree with Commissioner White that in order to get it right, we must "identify and test [these] assumptions [regarding] market structure [and its effects on investors]. *See* Chair Mary Jo White, Speech at the Security Traders Association 80th Annual Market Structure Conference Washington, D.C., *Focusing on Fundamentals: The Path to Address Equity Market Structure* (October 2, 2013), http://www.sec.gov/News/Speech/Detail/Speech/1370539857459.

If we go into the rewrite of the NMS Rules thinking that we are just solving the same problems, we will exacerbate the very different problems that we now face. That is, a rule adopted in 1975 may have quite a different effect in 2014. Let me provide one example of this.

The requirement that firms have an absolute obligation to trade with the best order on an exchange's book has one result in a market structure where (i) there is, for all intents and purposes, only one exchange and (ii) competition between orders leads to the best price being displayed on that one exchange. On the other hand, the same rule may have quite a different effect where (i) there is no limit on the number of exchanges, and (ii) competition to be at the top of an exchange's book results in an order being moved to a different exchange so as to be the best priced order on that other exchange. Consequently, in 1975, the rule may have created competition between orders; in 2014, the same rule today may exacerbate market fragmentation.[2]

Exchange Competition and Trade-Throughs (Why So Bad?)

At some level, the most fundamental decision that any securities regulator must make with respect to market structure is whether there should be one securities exchange, with the maximum possible depth and liquidity, or multiple exchanges competing with respect to the services that they provide market participants. There is something to be said for both structures, and the choice between them would be a very difficult one for the SEC to make—if there were in fact, a choice. But there is not. The government, and in particular the SEC, cannot and ought not order any "excess" exchanges to discontinue their business. We are stuck with the benefits and the problems of having multiple exchanges.

Of course, once we have more than one exchange, there is no right number. So long as exchanges can satisfy the demands of market participants by providing an attractive place to trade, may they live long and prosper.

The difficulty with multiple exchanges arises when they survive, not necessarily because they provide a place for the competing bids and offers of market participants to meet and interact, but because they provide a way to generate fees, directed by the government, that result from those bids and offers. This appears to be the case today: exchanges thrive—and what is more worrisome from a market standpoint, multiply--because the business of collecting and selling market data at SEC-regulated rates is thriving. Consequently, the exchanges are responding not so much to the demands of market participants, as to the incentives built into the system by the regulators.

So how do we let market participants demonstrate that they do not find real value in a given exchange. Fundamentally, it means that we have to let market participants elect not to trade on an exchange, even though it happens to display the best price. One way to let market

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[2] To better explain this, suppose the best bid on an exchange is 10. In 1975, a second bid at ten would have been executed behind the first bid. In order to get into first place, the second bidder would have to increase his bid to eleven. In today's market, with fifteen or so exchanges, the second bidder could move into the leading position, or at least a tie for the lead, not by increasing his bid but by moving his bid to a different exchange. So competition between bids has been replaced by dispersion of bids between exchanges, a condition also known as fragmentation.

participants demonstrate that they don't find value in an exchange, the simplest way in fact, is that we let them "trade-through" that exchange.

A "trade-through" sounds like a bad thing, like a slight, a measure of disrespect. It is impossible to read the Reg NMS Proposing Release and the NMS Adopting Release[3], and not to be struck by the strength of the opprobrium to trade-throughs. It's like hearing a Red Sox fan discuss the Yankees: they are simply bad, there is simply nothing good to be said about them.

The hostility to trade-throughs makes perfect sense in the context of a monopoly exchange (circa 1975, or even pre-NMS) where there would be little reason to trade around the best quote on the NYSE. It is harder to defend that regulatory hostility, other than as a habit of regulatory perspective, in a market structure that consists of thirteen exchanges, whose number is very possibly still growing. If we want to match the number of exchanges to the number that actually serves market participants, than we have to let market participants decide that they can avoid exchanges that do not serve them—that is, we have to allow exchanges the possibility of failure.

Consider our current direction: the costs of running an exchange are merely those of paying FINRA to surveil it and of running a computer server. Once an exchange is up and running, SEC rules demand that market participants honor the best bid on that exchange, even though the exchange does not provide any real market where there is an expectation that buyers and sellers come to that exchange for the purpose of doing business there. If FINRA surveillance costs are low enough, and if market-data fees are high enough, we can have a market structure with an infinite number of exchanges, one exchange for every bid or offer.

The alternative to a world of a separate exchange for every quote is a world in which exchanges may be allowed to fail. Allowing trade-throughs, at least for proprietary orders, would be a start in that direction.

Transparency vs. Dark Pools (What If We Called It Naked Bazaars vs. Protective Coves?)

A second regulatory assumption, or habit of mind, that transparency is always good, so good that it must be forced upon the market to the greatest extent possible, likewise deserves some scrutiny. Just as the regulatory assumption seems to be that market participants should be forced to defer to the requirements of every exchange, regardless of how little actual liquidity the exchange may provide, there seems likewise to be a regulatory assumption that so-called dark pools markets are bad, and ought to be shrunk down in size by force. But why that disparity in the treatment of businesses, exchanges and dark pools, providing similar services?

Given a choice between (i) the transparent display of quotes on the lit (exchange) markets or (ii) the execution of trades in a dark pool, it seems that the only acceptable choice is the oft-repeated mantra that transparent display of quotes on an exchange is preferable, and that we

[3] For citations of the materials used in this testimony, please refer to Appendix A.

should "seek to promote transparency to the maximum extent possible. . . ." [4] After all, we want transparent government and transparent regulation: shouldn't stock market quotes be the same way? The alternative "dark pools"—sounds just awful: a bit like underground caverns where blind prehistoric fish swim.

But I want to shift the perspective a little so that the terms we use to describe markets reflect appropriate assumptions and do not predispose us to conclusions that are not supported. What if we called exchanges, instead of lit markets, "naked bazaars?" What if we called alternative trading systems, instead of dark pools, "protective coves?" This change of terminology may cause us to question our assumptions. If you are a long-term institutional investor who takes large positions based on in-depth fundamental corporate analysis, where would you send your quote: (i) to be hung out in a naked bazaar exposed to the glare of high-frequency algorithmic momentum traders equipped with laser-speed co-located flickering quote transponders or (ii) sheltered in a protective cove? A "protective cove" sounds pretty nice and safe as compared to a naked bazaar.[5]

Implicitly or explicitly, we all recognize that transparency is not an unqualified good. If mutual funds and pension plans should be fully transparent, why not require mutual funds to broadcast their trading intent for the day in the morning, before the market even opens? If a little transparency is good: shouldn't more transparency be better? The answer to that question is of course no: we don't force mutual funds and the pension plans to be fully transparent because it would injure them. Other traders, knowing of the mutual funds' and pension plans' intent, would jump in the market ahead of them, to the detriment of these long-term institutional investors.

But if it is obvious that we ought not to force the mutual funds and pension plans to reveal their intent in the hours before they trade, why is it obvious that we ought to force them to reveal their intent thirty minutes before they trade, or one minute, or five seconds, or one second? In fact, might it not instead follow that the mutual fund could be better served by sheltering its quote in a protective cove until the very instant of execution?

As we re-examine the NMS Rules, rather than assuming that transparency is an unmitigated good, we should recognize it for what is: the forced transfer of knowledge from someone who has valuable information to someone who wants that valuable information. It can

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[4] *See* Opening Statement of Ranking Democratic Member Paul E. Kanjorski, *Hearing on Reviewing U.S. Capital Market Structure: Promoting Competition in a Changing Trading Environment* at 3 (October 30, 2003), http://archives.financialservices.house.gov/media/pdf/103003ka.pdf.

[5] While I thought that this was a very clever idea to rename dark pools, I learned to my chagrin that a very similar suggestion about the negative connotation of this terminology had been previously made by the ICI in its letter in regard to the Forced Transparency Release. In that letter, the ICI said:

> "We believe it is unfortunate that such a pejorative term [dark pool] has now become ingrained in the terminology used by the securities markets and policymakers to describe a type of trading venue that has brought certain benefits to all kinds of market participants, including funds and their shareholders. We therefore are reluctant to use the term when discussing issues surrounding this part of our market structure and urge that an alternative term be established to describe such venues." *See* ICI Comment Letter at footnote 6.

be in the public interest, at times, to force the broad dissemination of an institutional investor's information, but we should not assume it without question as a universal truth. Rather, when regulators assume that the greater good is advanced by ignoring the desires of the individual, regulators must bear the burden of proof and not satisfy themselves with stating what feels to them to be obvious.

Limit Orders Have Great Option Value (OK, But How Great Exactly?)

The basis for the assumption that transparency is of great value rests on the equally presumed-true-beyond-doubt assumption that there is great economic value in encouraging, or forcing, the public display of quotations.

The logic for this assumption sounds pretty straightforward: if an investor can look at the market and know that there is substantial buying power or selling pressure at particular price levels, the investor can gauge how strong the market is at those various levels, and thus know whether his trade is likely to move the market materially up or down.

But is this really true? If I put a firm bid on a house, and give you a week to accept or reject the bid, my firm bid has real value. It gives you time to assess the market and make a determination as to whether you can do better with another buyer.

On the other hand, if you see a quote in the securities markets, that quote is good for somewhere between a millisecond and a second. For something of a real-world illustration of this, one can look at the SEC's report on the Flash Crash: when the markets got uncertain, quotes vanished. Whatever is there now can disappear awfully fast. Again, this is not to dismiss the value of public limit-orders, but only to raise a question as to their value rather than assuming it. Quotes provide some indication of the depth of the market at some instant in time, but only for that actual instant (however long one thinks an "instant" is).

Continuing on this theme of valuing limit orders, the NMS Adopting Release in fact describes "limit orders" as options that have value to the market. This is economically true, and an astute manner of characterizing a limit order. That said, the value of an option is not an absolute: it depends on at least three factors: (i) the price at which the option can be exercised, (ii) the size of the option, and (iii) the time to expiration of the option. However, the NMS Adopting Release does not follow up on its own insight as to this economic value of limit orders.

As a starting matter, a limit order may have a very short life: possibly less than a second, so its time value is inherently quite limited—much less than my bid on your house that is good for a week. But what is even more important in light of the NMS Rules' emphasis on prohibiting trade-throughs is the size of the option: a larger limit order may have more economic value than a smaller limit order, even though the smaller limit order may be at a better price. Accordingly, by always favoring smaller, better-priced limit orders over larger limit orders (which is what the NMS Rules do with the trade-through prohibition), the trade-through prohibition may favor the less valuable option over the more valuable option.

Again, none of this is to say that limit orders do not have value and should not be encouraged. It is to say that the assumptions that the SEC makes as to their value both in relative

terms (always favoring price over size) and in absolute terms (ignoring time value entirely) are worth questioning.

Limit Orders Have Great Option Value (But Let's Not Reward Them—or Market Makers)

Let us assume that the SEC properly understood the real value of limit orders to the market. Let us then assume it is good policy to reward that gift of value to the market. How best to do it? There is only one way in which it is possible to reward limit orders and the firms that place them: by driving executions to them.

What follows from that is important if you are writing new rules: if we believe that market makers provide value to the market by being ready to buy and sell at all times, that is by constantly placing limit orders, then it follows that we should encourage that value by giving them first dibs at a trade, even priority over customers. After all, if there is no benefit to being a market maker, if it is better to be a customer, then it is not clear why anyone should want to be a market maker, or put themselves at risk by being in the business of writing options to the market.

The flash crash led many to question the value of technology. A better analysis, in my view, would lead us to ask whether we have under-valued market making, as we had back in the good old days, when the NYSE traded manually and specialists could provide depth-of-market. Back then, specialists were able and willing to do this, because the NYSE specialists of old had an economic interest in making the markets work and everyone benefitted from the smooth operations of those markets. What benefits do today's market makers receive by contrast?

The NYSE had a near-monopoly on the trading of major stocks, and it was able to share the benefit of this monopoly with its member firms, and particularly with the specialists. It was well-understood that the specialists made quite good profits, profits that were perhaps even extraordinary given the level of capital and resources that they committed. But the price of being able to keep earning those profits was a willingness to step up and put a limited amount of capital at risk in the direction of slowing market momentum. There was thus an unwritten deal made: specialists made extraordinary profits but risked the loss of some of those profits to dampen volatility. You can argue one side or the other: whether that was an absolutely fair deal, or whether the markets overpaid the specialists, but leaving aside the price, each side clearly had something to offer: the specialist made larger profits, but the specialist also took risk and acted to dampen volatility.

That deal is not going to happen in today's market structure. No exchange has anywhere near a monopoly on trading or any means of rewarding its specialist or market-maker firms with enough benefit to make the market maker want to stand in front of market momentum.

As we scrutinize our basic assumptions. The question for the regulators to answer should be whether, in the absence of a single exchange monopoly, it is possible to develop a regulatory structure that provides an affirmative reason to make markets. If there is no profit in being a market maker, why do it?[6] If there are not "real" market makers who will stay in the market at

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[6] A number of regulators have suggested that high-frequency traders should be required to register as broker-dealers. This misses the point entirely. It imposes a cost (complying with record-keeping, capital

all times and can make a profit at it, what is the long-term effect on spreads? What is the likelihood of more market breaks if no one has any incentive to fight the tape.

Information Is Good (But Not Without Interpretation and Anticipation)

The regulators tell us that they need better information in order to improve the workings of the National Market System. Soon we will have a Consolidated Audit Trail which will have infinite amounts of data. More information is generally a good thing. No one should discourage the acquisition of trading-data. But information is like a race car: it's no good in the garage.

So here are a few questions about information acquisition that should be considered very carefully. Is the SEC using the data it now has to the greatest extent possible? More importantly, is the SEC using that data in an open-minded manner, to really understand the markets, or is it selectively touting data that it believes consistent with its habits of mind. Take this example: if you assume that trade-throughs are bad per se, than any data that shows the existence of a trade-through seems to illustrate a problem. On the other hand, if you do not make that assumption, the discovery of a trade-through just leads us to ask a more significant question: why? What was the motive of the firm trading through? Was it an improper motive, to injure a customer? Was it to take advantage of a trade of larger size? Was it to avoid an exchange that has operational issues? If our only use of data is to confirm our expectations, then why bother collecting it? The value of trade data is only if we use it to understand the motivations of market participants, and if the regulators are open to being challenged in their assumptions, and even surprised.

More important than using information to describe the past - particularly when it comes to trading- is whether data provides insight into motivation and into future conduct; let us call this: anticipation. Trading is an exercise in anticipation, in strategy, in predicting the future, in guessing the behavior of others. When a regulator proposes to adopt rules that govern trading, the regulator must use the data that it has to anticipate the way in which the market participants will react to its proposals: Will the proposals cause markets to coalesce or to fragment? Will the proposals cause spreads to widen or narrow? Will the proposals incentivize market makers to dampen momentum or will they cause volatility to increase?[7]

How well have the regulators done in the past in anticipating how market participants will react to new rules? As to the NMS Rules, the NMS *dissenters* were more on target in their anticipation of the effect of the rules. They predicted (i) decreased quantity discovery, (ii) increased gaming opportunities, (iii) increased market fragmentation and (iv) increased volatility.[8] So obviously they used the data at hand pretty well. That raises the question: is more data required, or is more interpretation and anticipation required?

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and other regulations) on certain traders, but does not incentivize them to trade in a way that stabilizes the market. Putting a stick to high-frequency traders is not the same as putting a carrot to market making.

[7] The SEC has likewise previously recognized that market structure is also affected by markets' response to regulatory actions. *See* Concept Release at 74 FR 3594.

[8] *See* The NMS Dissent at 28.

Here is another example of a prediction: the conclusion of the SEC proposal on the Regulation of Non-Public Trading Interest. That proposal would be better titled the "Forced Transparency Proposal," because the gist of the proposal was that the SEC should force greater transparency of quotations.

The "Benefits" section of the Forced Transparency Proposal trumpets two "predictions":

> The Commission preliminarily believes that the proposed amendment [generally to discourage dark pool trading and force investors to display their quotes] would benefit market participants by increasing transparency and reducing the potential for a two-tiered market.
>
> The Commission also preliminarily believes that the proposed amendment would help encourage displayed liquidity in the form of publicly displayed limited orders.[9]

These predictions, I worry, are based on those unscrutinized assumptions. They do not seem to take account of or explain why the market has changed in the way that it has since the adoption of the NMS Rules. That is: why is there more fragmentation? Why are markets so much faster?

What if the Forced Transparency Proposal had instead said:

> The Commission preliminarily believes the proposed amendment [generally to discourage dark pool quoting and force investors to display their quotes] would benefit momentum traders by increasing transparency and so facilitating the ability of these opportunistic market professionals to anticipate the actions of, and front-run, institutional investors, thereby increasing the costs of long-term investments.
>
> The Commission also preliminarily believes that the proposed amendment would help encourage market fragmentation in the form of more dark pools as institutional investors seek to move their quotations from well-established, larger dark pools that would be forced to exhibit quotes under the Commission's proposal to newly created smaller dark pools that would not be required to show their bids in the public market.

Ultimately the difference between the conclusion that the SEC proposes and the one that I worry about will not turn on who has more information. It's about the better interpretation of that information and better anticipation of the effect of changes in the rules on the behavior of market participants.

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[9] *See* Regulation of Non-Public Trading Interest at 74 FR 61226.

Enforcement Is the Solution (to All Problems or Just Some Problems?)

Technology failure, of little significance in 1975, has become a paramount concern in writing new rules to protect the market. Limiting or stopping technology failure is, however, today, a principal goal of these regulators.

Given the serious consequences of technology failure, regulators turn to familiar tools in the tool kit. Greater enforcement is the solution that we know. Unfortunately, enforcement has serious limitations as a means of regulation. This is particularly true for the regulation of complicated structures such as the technology behind the national market system. While it may be unpopular to do so, we should concede that there are going to be malfunctions: they are inevitable in a market that is so dispersed (thirteen exchanges, all of whose prices must be checked, real time, seventy alternative trading systems), moves so quickly (in milliseconds) and is subject to so many complicated and interacting rules.

Technology error, however, is not the moral equivalent of a fraud. Nobody in the market wants to make a technological error. Mistakes can be enormously costly, even put firms out of business. So the discouragement value that sanctions have for fraud or misconduct are much less meaningful for technology failures. Firms are sufficiently frightened of technology failures that they will do whatever they can do to avoid them, without regard to whether an enforcement action will follow.

That means that when there is a technology glitch in the market, the assumption ought not to be that an enforcement action will follow: it's just coals to Newcastle. Rather, the assumption should be that an investigation will follow, and a report of lessons learned from the glitch will be made to the market so that others can benefit from it. While it will always be appropriate to punish intentional misconduct or gross negligence, it is often not appropriate to punish honest error (beyond the very significant dollar consequences that can result from the market punishing honest error).

In an appended memorandum to this testimony, independent research and consulting firm System Logic argues that the current tools of regulatory examination and enforcement action actually weaken the resiliency of the equity market, and suggests a model that looks to the regulation of commercial aviation as a guide to how the SEC might treat technology glitches. In financial regulation as in aviation regulation, we ought to prioritize public safety.

Exchanges Can Regulate Broker-Dealers (But They Shouldn't)

The reason commonly given why exchanges cannot regulate broker-dealers is that the exchanges are now "for profit" organizations. In my view, the real issue driving the debate over regulation of broker-dealers is that the reputational relationship between the exchanges and the firms that trade on them is dissolving.

In 1975, member firms of the NYSE might boast of their regulatory status as such, giving customers who dealt with them a confidence, whether or not well-founded, that NYSE member firms were subject to a tougher set of rules and a tougher regulatory structure. Further, NYSE firms might argue for the benefits of NYSE execution as providing some stamp of best price, whether or not that was actually true.

Today, all of that is changed. All firms are essentially regulated by FINRA; there is no set of tougher NYSE Rules, as the FINRA rules are being merged into the old NASD Rules so that all firms will be subject to a universal, one-size-fits-all FINRA Rule set. Even to the extent that exchanges may have their own rule books, those books are effectively enforced by FINRA. In 1975, broker-dealers might have established their credentials by boasting of membership on, and regulation by, the NYSE. That credential is now irrelevant. Under a single "self-regulator," FINRA, no firm can claim a marketing advantage by being associated with any particular exchange.

This separation of the reputation of the individual exchanges from the reputation of the various broker-dealers who trade on those exchanges means that the relationship between broker-dealers and exchanges is no longer a mutually positive reinforcing co-branding: it's just about economics. Exchanges and the broker-dealers are in a supply chain just like soy-bean farmers and vegetarian restaurants. They both want good tofu, but no one would assume that soy-bean farmers can regulate vegetarian restaurants, or the other way around.

This means that one component of the re-examination of the national market system must be re-examination of the role of the exchanges as regulators. The assumption that one participant in a supply chain of production should regulate another participant is very difficult to sustain. Further, it is bound to have at least one of two bad effects, and very possibly both. First, the regulating participant is subject to the costs of developing and maintaining a regulatory structure, not an insignificant burden on it. Second, the regulating participant uses its superior position in the regulatory hierarchy to bring it some competitive advantage, or at least advantage enough to offset the cost burden under which it labors.

Conclusion

I do want to concede to the difficulty of the task that confronts the SEC. Life at the SEC would be ever so much simpler with a one-exchange market as effectively existed in 1975.

Unfortunately, we must also concede that there is very little in today's markets that resembles the markets of 1975. Accordingly, it is incumbent upon the SEC to rethink the application of the goals expressed in the 1975 legislation to the markets of today.

This is not a small task. It will require the SEC to re-examine the role of every participant in the market system: exchanges, market makers, customers firms, proprietary traders, institutional investors and retail customers. It will require the SEC to look at the conduct of entities such as alternative trading systems that did not exist in 1975. It will also require the SEC to focus on every form of competition: not just price competition, but also data information competition and technology competition. Finally, it will require the SEC to look at the regulatory structure itself, at the role that it plays, that FINRA and the exchanges play, and at the tools that are used to regulate, including both the power to sanction and the power to investigate and teach. Fortunately, the SEC has consistently demonstrated since its creation that it is up to the task of dealing with great change, and this challenge should prove no different.

APPENDIX A

The majority of this testimony is derived from the following materials:

Regulation of Non-Public Trading Interest, 74 FR 61208 [SEC Release No. 34-60997] (November 23, 2009), http://www.gpo.gov/fdsys/pkg/FR-2009-11-23/pdf/E9-27951.pdf. (the "Forced Transparency Proposal").

Regulation NMS, 70 FR 37496 [SEC Release No. 34-51808] (June 29, 2005), http://www.gpo.gov/fdsys/pkg/FR-2005-06-29/pdf/05-11802.pdf. (the "NMS Rules," "NMS Adopting Release," "NMS Release").

The Dissent of Commissioners Cynthia A. Glassman and Paul S. Atkins to the Adoption of Regulation NMS, http://www.sec.gov/rules/final/34-51808-dissent.pdf. (the "NMS Dissent").

Report of the CFTC and SEC Staffs to the Joint Advisory Committee on Emerging Regulatory Issues, *Findings Regarding the Market Events of May 6, 2010* (September 30, 2010), http://www.sec.gov/news/studies/2010/marketevents-report.pdf. (Referred to as "SEC's report on the Flash Crash").

Investment Company Institute Comment Letter, *Re: Regulation of Non-Public Trading Interest (file no. S7-27-09)* (February 22, 2010), http://www.ici.org/pdf/24142.pdf. (Referred to as "letter on the Forced Transparency Proposal," "ICI Comment Letter").

SEC Staff of the Division of Trading and Markets, *Equity Market Structure and Literature Review, Part 1: Market Fragmentation* (October 7, 2013), https://www.sec.gov/marketstructure/research/fragmentation-lit-review-100713.pdf. (the "Market Fragmentation Report," "Paper on Market Fragmentation").

Regulation NMS Proposed Rules and Amendments to Joint Industry Plans, 69 FR 11126 (March 9, 2004), http://www.gpo.gov/fdsys/pkg/FR-2004-03-09/pdf/04-4712.pdf.

Consolidated Audit Trail, 77 FR 45721 [SEC Release No. 34-67457] (August 1, 2012), http://www.gpo.gov/fdsys/pkg/FR-2012-08-01/pdf/2012-17918.pdf.

Concept Release on Equity Market Structure, 75 FR 3594 [SEC Release No. 34-61358] (January 21, 2010), http://www.gpo.gov/fdsys/pkg/FR-2010-01-21/pdf/2010-1045.pdf. (the "Concept Release").

System Logic

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February 28, 2014

To: Members, House of Representatives Committee on Financial Services
Subcommittee on Capital Markets and Government-Sponsored Enterprises

Re: Using Regulation to Create a Reliable National Market System

Dear Chairman Garrett, Ranking Member Maloney, and Members of the Subcommittee:

Thank you for the opportunity for us to submit this exhibit to the House of Representatives Committee on Financial Services Subcommittee on Capital Markets and Government Sponsored Enterprises. We applaud the Committee for holding this hearing called "Equity Market Structure: A Review of SEC Regulation NMS" and are honored that Steven Lofchie, Partner and Co-Chair of the Financial Regulatory Group at the international law firm Cadwalader, Wickersham & Taft LLP, thought that the views of System Logic would be a valuable addendum to his testimony. We hope that this memorandum will aid the work of this Committee in considering how to create the right regulatory environment for a reliable and fair national securities market.

About System Logic

System Logic is an independent research and consulting firm that helps organizations manage complexity. System Logic works with both private- and public-sector clients and specializes in combining academic research with practical practices to help firms improve risk management and reduce their exposure to catastrophic failures, even as operations become more complex. More information about System Logic can be found at www.system-logic.com.

By drawing on experience in diverse industries and leading academic research, System Logic uses a sophisticated systems-level paradigm to help uncover and understand the risks that arise from the unexpected interactions present in complex systems, of which the current national market system is an example. It is through this lens that we turn our attention to the role of regulation in creating a reliable equities market.

Executive Summary

Mr. Lofchie requested that we address how complex systems, such as high-speed electronic trading, cause errors and why the tools of regulatory examinations and enforcement actions fail to prevent such errors. Additionally, he asked that we discuss how different regulatory approaches—for example, those used in the regulation of commercial aviation—might help inform the structure of securities regulation

and reduce the vulnerability of the equity market to catastrophic failure.

Complex systems can cause and magnify errors due to unexpected interactions that are difficult to understand and stop in real time. For electronic trading, these errors can be extremely costly and detrimental to the smooth and orderly functioning of the market. Unfortunately, the tools of regulatory examination and enforcement actions on which securities regulators rely do not reliably mitigate errors that arise from complexity. Rather, enforcement and examinations inadvertently create an environment that exacerbates the likelihood and severity of such errors, leading to a less robust and stable national market system. Instead, securities regulators should consider the tools that increase systemic reliability in commercial aviation, such as anonymous self-reporting, industry-led reliability monitoring, and no-fault investigatory practices, especially for severe errors. This memorandum discusses each of these issues in turn.

How the National Market System Causes and Magnifies Errors

The U.S. stock trading industry today is fundamentally different than it was at the turn of the millennium. One reason for the change is the increasing role of technology in securities trading. As it has with almost every aspect of modern life, technology fundamentally changed the way that market participants created models, processed data, and sent trades to the markets. The growth of the internet and rapidly increasing computing power yielded faster and cheaper communications and computation infrastructure, lowering barriers to entry and facilitating innovation in electronic trading.

A second, more direct reason for this change was the development of a modernized National Market System through the enactment of SEC Regulation NMS ("Reg NMS"). By implementing a rule requiring that quotes had to be honored on a national level, thus breaking the long-held monopoly of New York Stock Exchange ("NYSE") specialists, Reg NMS led to the interconnection of exchanges and shifted the vast majority of securities trades to anonymous, electronic interactions, facilitating a technology-driven approach to trading. While some effects of Reg NMS were immediately visible, the increased complexity of the resulting market system and its propensity for errors have been more difficult to recognize, even as the structure of the national market system itself creates profound challenges.

First, the changes due to the implementation of Reg NMS were overlaid on a legacy system which caused existing components to take on new roles for which they were not originally designed. For example, rather than christen new exchanges or redesign the trade matching process, Reg NMS required existing exchanges to connect in new and different ways. Although new technology was developed to implement Reg NMS on the exchange and market participant level, and there are quasi-standards like the Financial Information Exchange ("FIX") protocol,[1] the connected national market system relies on a

[1] Though FIX allows for a standard communications protocol between market participants, it often is implemented in idiosyncratic ways.

variety of distinct technology choices and rule implementations that vary between exchanges. These result in exchanges that are similar enough to provide little diversification from market-wide failures yet are different enough that their idiosyncratic features can create substantial problems.

Second, Reg NMS increased complexity and reduced tolerance to errors by significantly increasing the coupling (i.e., connectedness) among different participants of the national market system. Embedded in the operation of the individual exchanges of the national market system is a vast array of distinct functions that all need to be working properly. These include connectivity to broker-dealer participants and other exchanges; the conduct of automated opening auctions; the continuous matching of securities trades; and the real-time reporting of quotes, trade, and volume data both to subscribers of data from individual exchanges and the consolidated national reporting "tape." Many of these functions are *tightly coupled*, meaning that the failure of one quickly exerts a significant effect on the operation of the market system as a whole. As a result, broad swaths of the national market system may be crippled by a bug in a single ancillary component.

Third, given the raw number of software components and organizations involved, and the fact that the national market system was not primarily designed to maximize error-tolerance and robustness, it is now difficult to build effective redundancies into this system. Even when backup systems do exist, they are often vulnerable to the same failure against which they were designed to protect. Thus, what appear to be redundant features of the system might provide little redundancy in practice.

The failure of NASDAQ's Securities Information Processor ("SIP")[2] in August 2013 illustrates many of these points. The SIP consolidates and disseminates trade data nationally for NASDAQ-listed securities. A connectivity problem from another exchange overwhelmed the SIP's software which ran on the out-of-date Windows 2003 operating system.[3] Ultimately, the SIP's backup instance failed as well. As a result, the trading of all NASDAQ-listed securities which include Microsoft, Google, Facebook, and other tech giants, was halted nationwide for over three hours. Given the complexity of the national market system, such failures often are exceedingly difficult to identify, diagnose, and fix in real time.[4] But rather than rely on sharp troubleshooting skills and heroic real-time efforts to bring critical software components back online, the national market system should systematically be designed to reduce vulnerabilities and the impact of errors.

Indeed, similar problems affect the professional market participants (i.e., broker-dealers) as well. The competition that drives markets creates correlated risks that can lead to failures of the national market system as firms pursue similar strategies which rely on similar or identical sources of information. Again,

[2] The SIP, operated by NASDAQ, is for the reporting of trades in NASDAQ-listed securities.

[3] See Hope, Bradley. U.S. Exchanges Near Deal for Infrastructure Upgrade. *The Wall Street Journal*. Dec. 15, 2013.

[4] Indeed, attempting a fix in real time can cause additional problems, as seen in NASDAQ's handling of the Facebook IPO.

this leads to implementations that are similar enough to be vulnerable to the same sources of errors yet different enough to create a diversity of exposure to bugs and even potentially catastrophic failures. For example, market participants depend on the reliable and timely delivery of market data, yet bugs can occur in the firm-specific software implementations that integrate market data into trading systems, as occurred recently at a Merrill Lynch trading unit.[5] Moreover, technological features that are added onto legacy systems create complex vulnerabilities for market participants and have potentially powerful systemic consequences. For example, the SEC's recent detailed release on the failure of Knight Capital reveals[6] multiple layers of legacy software components that interacted in unexpected ways to nearly bankrupt the firm. In particular, code from a software component that had been discontinued nine years earlier accidently was reused. Because of the fast and tightly-coupled nature of electronic trading, this error was hard to identify, diagnose, and fix in real time. As a result, Knight suffered a loss of over $460 million in a span of 45 minutes—more than $10 million dollars per minute. During this time, Knight's automated order router inadvertently sent millions of orders into the market, causing market-wide disruptions and movements in the prices of 140 NYSE-listed stocks.

Finally, it should not escape notice that the current structure of the national market system and its potential intolerance to the failure of even relatively minor components leads to unnecessary geographic vulnerabilities. Finance is a key part of the national infrastructure. As a result of the events of September 11, 2001, organizations like the Depository Trust & Clearing Corporation which clears and settles the majority of U.S. equity trades, have developed geographically diverse backup and business continuity capabilities to maintain their ability to clear and process trades even if a protracted disruption were to affect the broader New York City region. And though financial services are concentrated in the New York City region, there are exchanges in locations such as Chicago, Philadelphia, and Kansas City. However, it is likely that the expected backup capability provided by this diversity is, to a large degree, *illusory*. In the event of a protracted disruption to New York City's power or telecommunications infrastructure, it is likely than an unexpectedly critical software component (such as a SIP system) will fail, preventing trading and thus grinding the national markets to a halt. This will persist until exchanges and market participants make *ad hoc* compromises, implement technical fixes, and obtain regulatory approvals to operate without an entirely functioning marketplace.

The Current Role of Regulators

Regulators have been struggling to deal with the tremendous shifts in the securities industry even as they have facilitated those shifts through the enactment of Reg NMS. By removing the barriers that limited competition, Reg NMS fostered the development of a complex national market with tightly coupled components and unexpected interactions between them. While there are tremendous benefits to the development of this competition-driven system, regulators have been slow to realize the limitations of their traditional tools in regulating such a market.

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[5] See FINRA's Letter of Acceptance, Waiver and Consent No. 20080145847-01 against Merrill Lynch.

[6] See SEC Release No. 70694, Knight Capital Americas LLC.

Bad Actors

Securities regulators are used to dealing with bad actors, not with complex systems. Regulators discover bad actors, like fraudsters, those with prior criminal convictions, or those misrepresenting information or misleading customers, through a variety of mechanisms, including an examination of books and records, requirements for background checks, or by collecting and acting on customer complaints. These are linear processes that lend themselves to investigation by teams of people armed with rulebooks (such as rules about how firms must store their books and records, for example). When violations are found, remedial actions are negotiated, mitigations are implemented, and firms are punished. Some cases are deemed worthy of enforcement and larger, usually civil, actions are brought against the offending parties.

This process does not mitigate or prevent errors that arise from complexity. While advances in real-time trading data collection and analysis will provide a more detailed and comprehensive picture of trading and might allow regulators to identify bad actors more effectively, it will not increase the stability of the markets. Even if regulators have access to copious amounts of data, the nature of systemwide failures in the national market system generally will be indirect and elude real-time analysis.

Examination and Enforcement

Examination and enforcement inadvertently create an environment that exacerbates the likelihood and severity of errors caused by complexity. When it comes to the complexity of electronic trading systems, examinations can only scratch the surface. Because software development is complex, and because most firms have unique trading systems, examiners scarcely are able to understand the detailed workings that might stem from the unexpected interactions of complex systems (consider, as examples, the failure of Knight Capital and NASDAQ's handling of the Facebook IPO). Furthermore, although regulations such as Rule 15c3-5 require broker-dealers to implement "reasonable" risk controls, reasonableness is not well-defined and there is not a universally accepted software development and testing process that implies reasonableness. As a result, examinations are most likely to discover errors that are self-reported (e.g., short-sale mismarkings[7]) and necessarily minor (otherwise, they likely would have been discovered due to their consequences, not during an examination). Thus, the regulatory examination of electronic trading systems likely is to be ineffective: It serves to highlight issues that already are understood and might discourage deeper self-examinations by broker-dealers for fear that regulators will harp on issues that are being self-corrected.

Enforcement actions (and the fear of enforcement actions) have a similar chilling effect on the systemic stability of the national market system. While it is important that errors are understood, and such understanding is widely disseminated to encourage learning across the industry, enforcement is a poor mechanism to pursue this, and SEC Orders are not the ideal means of dissemination. First, an

[7] While these may be important, the fact that they are self-reported is *prima facie* evidence that a firm is surveilling for, documenting, and, most likely, handling these errors in a thoughtful way.

enforcement action likely is to reduce the level of cooperation to the minimum required to be regarded as not obstructing an investigation. Second, enforcement increases the likelihood of certain types of errors. For example, market maker rules, enacted after the 2010 Flash Crash, require broker-dealers to continuously quote two-sided markets in securities in which they make markets; this restricts market makers' ability to stop trading in the face of a known or suspected systems malfunction. This increases the risk of a catastrophic failure, but firms are loathe to stop trading in the absence of a change in the rules or a no-action letter by regulators. Finally, through enforcement actions, regulators make inadvertent, and sometimes conflicting, *ad hoc* policies that usurp more carefully considered rulemaking and interpretation processes. For example, while the SEC's enforcement action against Knight Capital[8] admonished Knight for not identifying and fixing its coding issue before the start of the trading day through a quick *ad hoc* solution, the Order disciplining NASDAQ for its mishandling of the Facebook IPO criticized NASDAQ for implementing such a real-time *ad hoc* fix to try to salvage their ongoing technical problems.[9]

Furthermore, it is not lost on the industry that these Orders are in the form of enforcement actions, sending the message that, if you make a mistake, a disciplinary action will follow. This incentivizes broker-dealers to focus on the minutiae of a particular order and take corresponding corrective actions, rather than take a step back and assess what steps could increase the safety and reliability of their systems. This, in turn, reduces the resilience of the industry and makes failures such as those that occurred with Knight and NASDAQ more probable and potentially more severe.

Reducing Systemic Errors through Regulation

Managing and Preventing Crises

To reduce the potential for errors that arise from complex systems, regulators should temper their use of examinations and enforcement. Instead, they should increase the development of rules—such as limits and circuit breakers that pause trading—that can slow down the market during times of crisis and give participants time to identify, diagnose, and fix problems (including "fixing" a problem by stopping trading).

In addition to slowing the market down during times of crisis, regulators should foster an industrywide cultural emphasis on safety. Cultural change must start with the regulators themselves. If a firm needs to stop trading because they fear a technical glitch, regulators need to defer such decisions to firms themselves and encourage that they make such safety-oriented decisions without fear of regulatory consequences. Regulators either should amend marketing rules or adopt a no-action letter that enshrines a no-fault policy to the cessation of firms' market-making requirement when a technical problem is suspected and trading is halted.

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[8] SEC Release No. 70694, Knight Capital Americas LLC, p. 7.

[9] SEC Release No. 69655, The NASDAQ Stock Market, LLC, p. 6.

Moreover, regulators need to establish a clear public commitment to the integrity of the markets, even during times of crisis. Market-wide movements such as the Flash Crash were exacerbated as liquidity providers that may have been willing to purchase securities at low prices stopped trading because of uncertainty as to whether or not trades would stand or be busted. Notably, during Knight's crisis, Chairman Mary Shapiro was very clear that the trades that occurred because the trading glitch would stand as appropriate. This dampened the price swings caused by Knight's glitch. Regulators firmly should commit to and enshrine such a practice, even at the expense of helping potentially significant and politically important firms "do over" an electronic trading error that might cost billions of dollars.

Looking for Trouble

In the world of complex, tightly coupled systems that are the new normal in electronic trading, regulators proactively should "look for trouble," seeking out problem areas, such as bugs and potential adverse interactions among systems. This is in contrast to the standard approach of waiting for problems to occur and using infrequent examination—and enforcement-based regulatory activities to uncover them.

To look for trouble proactively, regulators should consider leveraging the experience and expertise of those already involved in electronic trading by partnering with broker-dealers to improve the stability of the marketplace. By creating a regulatory framework that focused on a partnership and maximized the reduction of systemic risk, regulators could leverage the direct operational experiences of broker-dealers in a structured way. Such a framework could create a reliable and effective paradigm to identify, mitigate, and even predict risks, communicate findings across the industry, and simultaneously retain the power of regulators to enforce as a last resort.

While this proposal may sound radical in the securities context, such a partnership characterizes the effective and safety-driven regulatory scheme present in modern commercial aviation.

Preventing Crashes: Lessons from Commercial Aviation

The complex system of commercial aviation provides an example of the successful regulation of another national asset whose safety and reliable operation is critical to national interest. Although an in-depth comparison between the system of commercial aviation and the national market system is outside the scope of this memorandum, sufficient similarities exist, and securities regulators might consider the tools used within aviation to increase systemic reliability.

Anonymous Self-Reporting

Aviation uses anonymous reporting to collect and share data on near misses and regulatory violations across the industry. Individuals, from maintenance technicians and dispatchers to flight crews and air traffic controllers, can self-report errors. As an incentive for such reports, proof of a report submitted will result in waived sanctions from a regulatory violation, assuming it is in the absence of intent or gross negligence. Note that these are not "whistleblower" reports but, rather, individuals incentivized, through a waiver of sanctions, to contribute to the overall safety of the industry. This system leads to

industrywide benefits because operating entities (such as commercial airlines) can obtain information relevant to the safety of their operations that they would never have otherwise obtained and are able to act on that information to mitigate vulnerabilities due to similar circumstances. Additionally, airlines and aircraft manufacturers themselves can self-report issues to regulators. These reports include corrective actions taken, if any, and are not used as the basis for regulatory enforcement; further, the timely provision of a self-report (before the FAA begins an enforcement action) revealing the company's violation and its corrective action will avert the enforcement, under this program.

By analogy, securities regulators, traders, and a firm's compliance might work together to review self-reports of incidents, and agree on corrective actions, outside of the context of enforcement actions. This would help firms identify whether, for example, errors have occurred in the deployment of critical software (even if those errors did not have direct consequences), understand the root causes of the incorrect deployments through an analysis of self-reports, and subsequently develop software to surveil for incorrectly deployed software or create new procedures to mitigate the issue.

Industry-Led Reliability Monitoring

Following the crash of ValuJet 592 in 1996,[10] the FAA began to recognize that the systemic complexity of modern airline operations exceeded their ability to directly regulate. While the FAA still has responsibility as a regulator, it began to facilitate industry-lead safety and reliability monitoring, ultimately through an operator-implemented Safety Management System ("SMS") framework.

The FAA recognized that commercial operators, through their day-to-day "on the ground" (and in the air) experiences, have insights into safe operations that regulators do not. To take advantage of these insights, an SMS typically involves four major steps: obtaining information, analyzing the resulting data to identify and classify risks, changing operational procedures to mitigate the identified risks, and auditing to ensure the changes were effective. With information about routine and non-routine events as the bedrock of the SMS process, typical data sources comprise voluntary reporting systems, large volumes of recorded information about routine operations, directed investigations of non-routine events, and proactive auditing and probing of daily operations. The goals of an SMS are to encourage the development of safety management capability, increase confidence in risk controls, and increase the reliability and effectiveness of risk mitigations. To facilitate regulatory participation, the SMS process depends on an interface to promote knowledge sharing between regulator and commercial operators. Ideally, such a system also would support safety and systemic reliability between operators by allowing the sharing of data and safety insights.

[10] Mislabeled and mispacked hazardous cargo, packed by a maintenance contractor, was improperly loaded onto the flight. The resulting fire brought down the aircraft and killed all 110 souls on board. Post-accident, the regulator identified that the airline's oversight of its subcontractor was inadequate and that its own regulatory surveillance of airlines was not capable of reliably identifying and correcting systemic flaws such as these.

While the success of an SMS depends on industry and regulator working hand-in-hand, the FAA still has enforcement tools to identify bad actors and maintain oversight. The FAA, however, recognizes that some of the key incentives of commercial airlines (analogous to broker-dealers) and regulators are aligned: to avoid catastrophic failures that result in loss of life (for broker-dealers, massive loss of profits) and the consequences that follow.

In the context of finance, an analogous system would specify rules that broker-dealers were required to follow to collect data on systems problems and analyze the resulting data to identify and classify risks (e.g., coding errors, connectivity problems, incorrectly set limits, etc). The data and analysis would be for the broker-dealer itself. Each broker-dealer would be responsible for specifying an appropriate form for the data, methods of collection, and techniques for analysis, rather than being required to shoehorn results into a one-size-fits-all data model specified by the regulator. Any changes in operations or procedures to mitigate identified risks would be followed up with internal spot-checks and audits to ensure that the changes were effective. A well-structured system of this kind would be more effective than the current trend toward unspecified compliance involvement in the highly technical process of controlling electronic trading risk. Finally, such a system would allow regulators to examine the results of each firm's risk management process which would give regulators insight into important operational concerns, rather than the more distant view generally afforded by regulatory exams.

No-Fault Investigations

In addition to anonymous self-reporting and industry self-monitoring, commercial aviation benefits from the independent contribution and expertise of the National Transportation Safety Board ("NTSB") which has the primary authority to identify the causes of aircraft accidents in the United States. The NTSB's chief mission is to promote safety.

Through its role as a non-regulatory investigator that does not bring enforcement actions, the NTSB investigates accidents and serious incidents. The products of its investigations are recommendations to prevent the recurrence of similar events. While these recommendations are not binding on the regulator, the NTSB achieves substantial compliance with its recommendations from both the regulator and operators. By being sensitive to failures that underlie rare, major events with highly negative outcomes (e.g., fatal airline accidents), the NTSB can detect issues that affect systemic safety and mitigate risks that apply broadly to worldwide aviation operations. Indeed, the NTSB's explicit focus on safety, rather than enforcement, even allows it to consider and reveal the role that regulatory failures might play in causing errors. Overall, the agency's focus on highly consequential events complements the above-described safety management systems which focus primarily on safety issues arising from routine events and minor incidents. In sum, the NTSB acts as a *blocker*, a technically oriented and informed third party that is not held captive to the compromises of the rulemaking process.

We suggest that a similar approach would greatly enhance the stability and robustness of electronic trading. For example, the SEC's Orders following the Knight failure and NASDAQ's mishandling of the Facebook IPO were valuable to the entire electronic trading industry precisely because they provided details about the errors in Knight's and NASDAQ's electronic-trading systems that other participants

could learn from and avoid. Moreover, these Orders illuminated how human judgment might interact with highly technical systems during such crisis events, potentially allowing others to make more effective decisions in the face of unfolding failures. However, because these Orders were enforcement actions, they shifted the focus of firms from increasing reliability to implementing *ad hoc* suggestions to avoid punitive action. Furthermore, because such investigations are conducted by the regulator itself, their results typically shed little light on the role of rules, regulations, and regulators in shaping the environment that contributed to failure. Creating an independent and non-regulatory party with the power to investigate major incidents would strengthen the resilience of the finance industry and improve the reliability of the national market system.

Conclusion

Securities regulators have a daunting task in increasing the reliability of the national market system. As technology has evolved, and as Reg NMS has facilitated competition and interconnectedness, the complexity of the national market system has increased significantly. To date, regulatory tools have reflected traditional priorities in catching bad actors. But unlike with other regulatory concerns, such as insider trading, the management of electronic trading systems should have few bad actors—as firms already are incentivized to prevent the catastrophic failure of their trading systems—and so regulatory examinations and enforcement actions actually decrease the reliability of the national securities market.

Instead, securities regulators should consider adopting lessons from commercial aviation which, analogous to the securities industry, operates in a high-risk environment demanding high reliability: anonymous self-reporting, industry-led monitoring, and no-fault investigations. By defining risk management and mitigation as corporate responsibilities for the airlines, and by changing the focus of its surveillance and oversight to ensure the reliable and effective function of these corporate activities, the regulatory functions of the FAA have the opportunity to be much more effective. Also, by explicitly separating FAA enforcement and the NTSB's accident investigation practice, and by endowing the NTSB with an independent mission of promoting safety, commercial aviation regulations have successfully empowered a technically sophisticated group with the tools to increase aviation safety.

Securities regulators might consider adopting such methods, lest our national market infrastructure becomes overwhelmed by a series of increasingly frequent and violent errors that shake the confidence of the investing public and the world. Too much of the nation's economic well-being and competitiveness is at stake to be bound by an ineffective *status quo*.

Respectfully submitted,

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Equity Market Structure: A Review of SEC Regulation NMS

Before the House Subcommittee on Capital Markets
and Government Sponsored Enterprises
February 28, 2014

1. Introduction

Chairman Garrett, Ranking Member Maloney, and Members of the Committee:

Thank you for inviting me to testify today on the topic of Regulation NMS and U.S. equity market structure. I am currently a Professor of Finance at Babson College in Wellesley, Massachusetts. I worked for the SEC on two occasions, first from 1996-1999 as the Chief Economist, and then from 2006-2009 as the Director of the Division of Trading and Markets.

2. Current equity market structure

Regulation NMS is just shy of being nine years old.[1] When evaluating market structure regulation, one must acknowledge how relatively well our equity markets function. In so many ways, these markets are the envy of the world. They are deep, liquid, and constantly evolving. Throughout the credit crisis, they performed well, even when liquidity vanished from other markets and credible prices could not be established for many instruments.[2]

The success of U.S. equity markets is all the more remarkable given the breadth and variety inherent in their structure: More than a dozen registered exchanges and more than 60 other market trading centers are linked by high-speed networks, all of which are supplemented by the negotiated upstairs and OTC markets. These other market trading centers come in various forms and names: ECNs, ATSs, internalizing broker-dealers, institutional order matching systems, and dark pools. The traditional model of trading on an exchange floor, with specialists and market makers, is no longer viable as a standalone entity. It is simply not profitable to trade that way anymore, as the NYSE found out in the middle of the last decade. That change was not *per se* caused by Regulation NMS as much as it was a consequence of the move to more automated markets and the loss of certain ITS protections. Today, a modern electronic market-maker that trades as much as 15% of the daily volume in a large-cap NASDAQ stock may earn as little as 1 or 2 hundredths of a cent ($.0001-$.0002) per share.

The large number of trading venues in the United States provides both benefits and challenges to market participants as well as to regulators. The old worry about a dominant primary market acting as a monopolist is now gone. In its place are a series of new issues concerning fair access, connectivity, computerized trading, and the robustness of systems.

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[1] Regulation NMS, Securities and Exchange Commission Release No. 34-51808, June 9, 2005.

[2] "Equity Trading in the 21st Century," James Angel, Lawrence Harris, Chester S. Spatt, Working Paper, May 18, 2010.

The modern era of electronic markets began in 1996, with the SEC's promulgation of the Order Handling Rules that removed a two-tier market structure that existed on NASDAQ. This change was closely followed by Regulation ATS, which provided a framework for new electronic trading systems to develop outside of the framework of full exchange regulation. The change of stock price increments from eighths, to sixteenths, and finally to pennies occurred in the early 2000's. Even with these changes, however, market centers were integrated in only the most rudimentary sense: Trade execution times on some markets were measured in tens of seconds just ten years ago and orders were routed among market centers using an inefficient system known as ITS. Then in 2005 the SEC adopted Regulation NMS to address some of the perceived problems that had arisen in equity market structure over the previous decade.

3. Regulation NMS

Regulation NMS was a controversial rule at its adoption. The record of testimony, comment letters, and statements reflects proponents and dissenters among market participants as well as at the Commission. At its core NMS has four prongs:

1. The Order Protection Rule protects immediately accessible quotes at automated market centers by requiring incoming orders to interact with the top of their order books, and requires markets to avoid so-called "trade-throughs." One of the reasons cited for the promulgation of this Rule was the finding that retail orders were receiving inferior executions at certain broker-dealers, and not receiving the benefit of better prices elsewhere in the marketplace.

2. The Access Rule allows private linkages among market centers, and limits access fees to a maximum of three mils ($.003) per share. The Rule also requires market centers to avoid locking or crossing the protected quotations of other markets. Some commentators have cited this rule as contributing to a situation where certain market participants trade explicitly to arbitrage access fees and liquidity rebates charged by different market centers.[3]

3. The Sub-Penny Quote Rule prohibits quoting in less than one-penny increments for stocks priced over one dollar per share. The Rule was designed to mitigate the so-called "stepping ahead" problem, where traders place orders at prices incrementally better than pre-existing exchange limit orders, thereby stepping ahead of these existing orders. This behavior discourages the display of customer liquidity, and can effectively bypass traditional exchange price-time priority rules.

4. The Market Data Rules sought to allocate market data revenues among market centers to encourage and reward the dissemination of useful trading and quotation data.

4. Considerations when modifying market structure rules

Regulation NMS, coupled with the evolution in firms' business models, advancements in communications, improvements to trading infrastructure at market centers, and development of

[3] "Maker-Taker Pricing Effects on Market Quotations," Larry Harris, Working Paper, USC Marshall School of Business, August 30, 2013.

computer-driven order strategies, have reshaped equity trading in the United States. But what haven't changed are certain facts about market participants that affect trading and routing decisions. Among these, I include the following:

a) Traders avoid revealing their unexecuted trading interest to the market. This observation is not a statement about the harmful use of dark pools or opaque order forms. Rather, traders have always valued confidentiality, a benefit historically conferred through use of the traditional exchange trading floor. Any rules to enhance transparency are constrained by this desire for confidentiality, as traders forced into a transparent market against their wishes will elect not to submit their orders in the first place, holding them "upstairs" until they are ready. There is thus a limit to how much transparency can be brought to any marketplace.

b) There will always be some investors with superior trading skill or information that want to capitalize on their advantage. At the same time, less-skilled or informed traders will try to avoid trading with skilled traders wherever possible. These forces can lead to a natural segmentation of markets.[4]

c) You cannot force liquidity providers or market makers to provide liquidity to a marketplace if it is not profitable for them to do so. They will simply exit the market. This principal contributed to the demise of traditional market makers and specialists on physical exchanges.

d) Brokers own the relationship with retail and institutional customers, and will attempt to protect and profit from these relationships.

Regulating trading is difficult in part because trading has traits of a zero-sum game. Once a marketplace reaches a level of efficiency, regulatory changes that confer gains to one set of market participants often come at the expense of other participants. For example, in the mid-1990s the SEC, in its desire to promote competition for the New York Stock Exchange, began allowing a practice known as *preferencing* to occur on the regional exchanges. This change promoted competition among market centers at the potential expense of execution quality for customer orders executed on the regional exchanges.[5]

One indication of the efficiency of U.S. equity markets is the ease with which order flow can be re-routed among market centers based on very small changes in prices or costs. For example, so-called maker-taker fees typically range from 0.1 to 0.3 cents per share, with the profit to the exchange being a function of the difference between the access fee received and liquidity rebate paid. Changes in fees of as little as $.001/share can cause order flow from one venue to be rerouted to another as brokers attempt to lower costs or earn higher rebates from customer flow. The fact that large movements in order flow result when costs or prices move by as little as a tenth of a cent is both a testament to the quality and efficiency of our market and a cautionary tale to regulators. It demonstrates how sensitive business models are to very small changes in

[4] Examples of such segmentation include ITG's POSIT system as well as Liquidnet.

[5] "Order Preferencing and Market Quality on U.S. Equity Exchanges," Mark Peterson, Erik R. Sirri, Review of Financial Studies, 2003, vol. 16, No. 2, 385-415.

costs, and how quickly trading platforms, brokers, dealers, investors, and exchanges can react to changes in the competitive landscape. One should expect that any meaningful change in equity market regulations will have large consequences in the routing of orders and business models of market participants.

I understand that SEC Commissioners have been calling for broad review of equity market structure.[6] Chairman White has announced plans for a review of equity market structure and has instructed the staff to develop the necessary empirical evidence to accurately assess our current market structure and to consider a range of possible changes.[7] I believe that a thorough study such as the one the Commission is contemplating is an important step to complete before implementing any substantive change to market structure regulation.

5. Two final thoughts

I would like to offer two final thoughts. First, as important as it is to revisit our equity market structure, I would be remiss if I didn't highlight the need for improvements in the structure of our fixed income markets. U.S. fixed income markets (including the corporate, municipal, and Treasury bond markets) are larger than our equity markets. Bond investors trade using an opaque OTC network of dealers in which retail investors may pay spreads of 3%, 4% or even 5% as bonds move from sellers to buyers.[8] In contrast, the same investors in trade equity markets in millisecond turnaround times and stocks may trade in spreads less than one-tenth of a percent. I hope that regulators are able increase their focus on the trading structure of these vital markets.[9]

Second, I think it is important in any review of equity market structure to continue focusing on the responsibilities of brokers that handle customer orders and their "best execution" duties. Although market structures have an ephemeral quality, the principal underlying common law duty of best execution associated with broker-dealers who handle customer orders is a constant. Existing interpretations of the duties of "best execution", however, have not have kept pace with the changes in market structure and with automated trading.[10] Examples of potential concerns

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[6] See "Market 2012: Time for a Fresh Look at Equity Market Structure and Self-Regulation," Commissioner Daniel M. Gallagher, October 4, 2012; "Seeing Capital Markets Through Investor Eyes," Commissioner Luis A. Aguilar, December 5, 2013; "The Benefit of Hindsight and the Promise of Foresight: A Proposal for A Comprehensive Review of Equity Market Structure," Commissioner Michael S. Piwowar, December 9, 2013; Remarks before the Trader Forum 2014 Equity Trading Summit, Commissioner Kara M. Stein, February 6, 2014.

[7] Chairman's Address at SEC Speaks 2014, Chairman Mary Jo White, February 21, 2014. At this speech Chairman White also announced the intention to implement a tick-size pilot.

[8] For municipal bonds see "Secondary Trading Costs in the Municipal Bond Market," Lawrence E. Harris and Michael S. Piwowar, The Journal of Finance, Vol. 61, No. 3 (Jun., 2006), pp. 1361-1397. For corporate bonds see "Transparency and Liquidity: A Controlled Experiment on Corporate Bonds," Edie Hotchkiss, Michael Goldstein, Erik R. Sirri, Review of Financial Studies, 2007, Vol. 20, No. 2., 235-273.

[9] For example, see Remarks at the Conference on Financial Markets Quality, Speech by Commissioner Daniel M. Gallagher, Sept. 19, 2012; "Bringing Municipal Bond Trading Into the Light," Speech by Commissioner Elisse B. Walter, Oct. 1, 2012.

[10] For example, see Securities Exchange Act Release No. 37619A (Sept. 6, 1996), 61 FR 48290, ("Order Handling Rules"), at section III.C.2, "The Commission believes that broker-dealers deciding where to route or execute small customer orders in listed or OTC securities must carefully evaluate the extent to which this order flow would be afforded better terms if executed in a market or with a market maker offering price improvement opportunities. In conducting the requisite evaluation of its internal order handling procedures,

include the effects of access fees and liquidity rebates on broker routing decisions, and the routing of non-marketable customer limit orders to exchanges rather than to other venues more advantageous to the limit order.[11] While on the one hand "best execution" is an imprecise concept, it is also a flexible one that can be adapted to the changing market structures we see today. The Commission should, as part of its review market structure, revisit their guidance on best execution and consider whether another approach, such as one based on policies and procedures, would be useful in augmenting any change to market structure under consideration.

I believe there is little question that our equity markets are better today than they were ten years ago. The harder question to answer is whether they could have been, or can yet be, a better marketplace through revisions to our existing market structure rules.

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a broker-dealer must regularly and rigorously examine execution quality likely to be obtained from the different markets or market makers trading a security." See also "Best Execution," NASD Notice to Members 01-22, April 2001, at pg. 205, "At a minimum, firms should conduct such [regular and rigorous] reviews on a quarterly basis; however, members should consider, based on the firm's business, whether more frequent reviews are needed, particulartly [sic] in light of the monthly market center statistics made available..."

[11] For an empirical analysis of agency problems in limit order routing, see "Can Brokers Have it all? On the Relation between Make Take Fees & Limit Order Execution Quality," Working Paper, by Robert Battalio, Shane Corwin, and Robert Jennings, November 5, 2013.

Chester Spatt's Statement for House Subcommittee on Capital Markets and Government Sponsored Enterprises (GSEs) hearing on "Equity Market Structure: A Review of SEC Regulation NMS," February 28, 2014.

I am pleased and honored to have the opportunity to present my views to the House Subcommittee on Capital Markets and Government Sponsored Enterprises (GSEs) at its hearing today on "*Equity Market Structure: A Review of SEC Regulation NMS*." I am the Pamela R. and Kenneth B. Dunn Professor of Finance at the Tepper School of Business at Carnegie Mellon University, where I have been a faculty member since 1979. I also served as the Chief Economist of the U.S. Securities and Exchange Commission from July 2004 until July 2007. My expertise as a faculty member includes such areas as trading mechanisms, market microstructure, trading, financial regulation, and the financial crisis. In addition to my faculty position my current affiliations include serving as a Research Associate of the National Bureau of Economic Research, Senior Economic Advisor to Kalorama Partners, a member of the Shadow Financial Regulatory Committee, the Financial Economists Roundtable, the Systemic Risk Council and the Federal Reserve's Model Validation Council. I also was one of the founders and the second Executive Editor of the *Review of Financial Studies*, which quickly emerged as one of the

preeminent journals in financial economics, as well as a Past President and Program Chair of the Western Finance Association.

There have been dramatic changes in the structure of our equity markets over the last two decades, reflecting both changes in technology and regulation. Prior to Regulation NMS, we saw dramatic reductions in the tick size from 1/8 to 1/16 to .01, due to decimalization. In the aftermath of Regulation NMS there is much faster execution due to the preference NMS provided to "fast markets" as well as greater competition among platforms and more fragmentation of order activity among platforms, as reflected by the decline in the New York Stock Exchange's share of trading in its own listings from about 80% to 20%. We have seen substantial declines in spreads and trading costs, especially at the retail level, in the aftermath of Regulation NMS, as well as a variety of "unintended" consequences of the regulatory changes.

I am pleased that the Subcommittee has organized today's hearing and focused attention on Regulation NMS. This illustrates an important change in the regulatory and oversight process. What I have observed in the past is that financial regulators rarely undertook serious retrospective reviews of the consequences of their actions and indeed, in the past cost-benefit analysis has not been a central priority of financial regulators. Financial regulators are now much more focused upon the importance of

cost-benefit analysis in light of various rulings by the District of Columbia Circuit Court of Appeals, several Executive Orders by President Obama and feedback from the Congressional oversight committees. Regulators have become much more sensitive in the last few years to understanding the full consequence of proposed regulations.

Along such lines, it is important for the SEC to help create the data to allow it (and others, such as academic economists) to study the impacts of various regulations. For example, in the context of decimalization I am pleased that the SEC now is signaling that it plans to undertake an experimental "pilot" analysis. It is not that I expect that wider ticks will significantly enhance the trading process and indeed, I am rather doubtful that wider ticks would have meaningful impact on IPO decisions. Instead, I feel that as regulators try to fine tune the structure of our markets that it is important that these decisions be consistent with well-informed economic analysis. The judgments by the SEC and other financial regulators should be heavily guided by data, including when necessary, data that the regulator generates. During my service as the SEC's Chief Economist this occurred most meaningfully in the pilot analysis that underlay the modernization of pricing restrictions on short sales, the Regulation SHO repeal of up-tick restrictions on short sales.

Ultimately, Reg NMS did have some profound impacts on the structure of equity trading. Putting aside briefly the particulars and whether NMS created its own distortions, NMS had the effect of resolving important open issues and in that sense provided considerable clarity to the trading community. The regulatory certainly that emerged shortly afterwards had been very helpful in encouraging the development of new platforms and the restructuring of existing ones. Indeed, regulatory uncertainty has been a serious problem in other facets of financial regulation in recent years. One of the more striking consequences of NMS was its emphasis in promoting electronic trading—the "fast markets." Specialists could no longer retain a thirty-second option to evaluate competing alternatives through the old ITS linkage. This helped open up the markets in my view and substantially contributed to the decline from 80% to 20% in the New York Stock Exchange's market share of its listed securities.[1] This has contributed to the greater fragmentation of trading and liquidity with enhanced competition in the quoting process. In several studies my co-authors and I document substantial declines in trading costs in the years following the adoption of Regulation NMS.[2]

[1] Incidentally, the New York Stock Exchange supported Reg NMS in the form adopted in which the order protection rule only protected the tops of the respective limit order books.

[2] See discussion in Angel, J., L. Harris and C. Spatt, 2011, "Equity Trading in the 21st Century," *Quarterly Journal of Finance*, 1, 1-53 as well as in our recent paper Angel, J., L. Harris and C. Spatt, 2013, "Equity Trading in the 21st Century: An Update."

At the same time, I see a number of concerns that NMS may have helped to foster. At its core NMS is highly prescriptive, which implies that aspects of its mandate can become entrenched and needlessly protect against potential market competition. To some extent, NMS imposes a degree of price-fixing and treats the pricing from different platforms equivalently and regards price outcomes as the product that various platforms provide. This limits the extent to which platforms can consider differentiating themselves and instead imposes a "one size fits all" structure. Meanwhile some platforms are performing SRO services, while others are providing more modest compliance services. This raises the question as to whether price is all that matters from an investor's perspective.

One of the most striking aspects of NMS is the structure of its order protection rule. While orders at the top of the book from each platform are protected, orders below are not. Though I am not advocating extending the protection all the way down the book (which would even be more prescriptive than the current form and add to the technological burden of the rule), such an approach would be more coherent because protection would be provided to orders at a given price level regardless of platform. In contrast, the structure of NMS does not protect orders above a threshold price, but instead only those at the very top of each platform's book. In effect, the orders protected are not at a continuous set of prices.

While I do think there are a variety of reasons for the increase of fragmentation that has resulted from NMS including competition across platforms that limits rent extraction by intermediaries, one contributor to fragmentation that is quite undesirable in my view is a direct consequence of guaranteeing protection at the top of each platform's book. NMS creates an incentive against consolidation of platforms and even an incentive for platforms to arise and to quote because of the special advantage being provided under NMS for the best bid and offer on a platform.

Presumably, one of the motives for order protection in the broad is to ensure that platforms are not disadvantaging customers relative to the available alternatives. Yet NMS does so only relative to the top of the book and not against the entire book. Furthermore, brokers have had a longstanding best execution responsibility with respect to how they route trades. While that responsibility is not as prescriptive as the NMS requirement on platforms, regulators should ensure that brokers are fulfilling their responsibility by having appropriate standards and protocols for routing orders. One metric that we should look to for evaluating NMS is whether it has reduced somewhat the extent of abuse of Best Execution responsibilities. More broadly, the interaction and overlap between Best Execution and NMS is an important issue for regulators to

consider because of the complementary aspect of these rules and one that I don't believe has received the attention that it deserves.

Important distortions in execution strategy and routing decisions arise from the "make or take" pricing that is permitted under Regulation NMS.[3] These distortions arise at various levels. For example, there are incentives to collect liquidity rebates and avoid fees for taking liquidity. At the same time these fees and rebates are often booked to the broker rather than the customer, potentially significantly distorting the choice of venue in the routing decisions. Indeed, most routing decisions are not based on the effectiveness or timeliness of anticipated execution given equilibrium behavior. The regulatory structure sets the stage for conflicts of interest that would not arise intrinsically—after all, in most commercial relationships it would be illegal for the purchasing agent to receive direct payments from the buyer. Potential fixes could be straightforward, but much of the structure of the industry has developed around the distortions induced by the regulatory structure. An important point to emphasize is that the make-or-take distortion is now much larger than at the time of the adoption of NMS since the nominal magnitude of the fees and rebates are the same, but the base (the effective spread) is much lower.

[3] A more detailed discussion of these issues is provided in Angel, J., L. Harris and C. Spatt, 2011, "Equity Trading in the 21st Century," *Quarterly Journal of Finance*, 1, 1-53 as well as in our recent paper Angel, J., L. Harris and C. Spatt, 2013, "Equity Trading in the 21st Century: An Update."

While NMS is highly prescriptive, I would suggest that a natural approach for developing modifications and revisions is for the SEC to lay out principles and standards that market designs should satisfy. Indeed, such an approach would allow the regulator to focus on its strengths—investor protection and the development of core principles that market design should satisfy.

In conclusion, I want to emphasize that I regard NMS as having contributed to some important improvements in our equity markets, including greater competition, lower spreads and even lower institutional trading costs. The clarity and regulatory certainty that NMS created for a time soon after its adoption also was very helpful in the late 2000s, yet largely lacking in recent discussions of financial regulation in broader contexts. NMS is an important issue because of its central role in equity market structure framework. Indeed, I strongly support recent calls for a comprehensive review of equity market structure.[4] I feel that too much of the focus in discussion of the equity market structure has been on high frequency trading and especially the 2010 flash crash and other trading snafus. This distracts us from important broader aspects of equity market structure.

[4] For example, see Aguilar, L., "Seeing Capital Markets through Investor Eyes," Washington, December 5, 2013; Gallagher, D., "Remarks at FIA Futures and Options Expo," Chicago, November 6, 2013; and Piwowar, M., "The Benefit of Hindsight and the Promise of Foresight: A Proposal for a Comprehensive Review of Equity Market Structure," London, December 9, 2013.

As I conclude, I also want to observe that I find fascinating the surprising degree of attention paid to equity as compared to fixed-income trading. Yet I would anticipate that there would be much greater scope for improvements in fixed-income trading, compared to equity trading. This was striking to me as well during my service as the SEC's Chief Economist from 2004 to 2007. In reviewing market structure I would not focus solely on equity trading.