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HIGH FREQUENCY AND AUTOMATED TRADING IN FUTURES MARKETS

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HIGH FREQUENCY AND AUTOMATED TRADING IN FUTURES MARKETS

Tuesday May 13, 2014

UNITED STATES SENATE,
COMMITTEE ON AGRICULTURE, NUTRITION AND FORESTRY,
Washington, DC

The Committee met, pursuant to notice, at 10:03 a.m., room 328A, Russell Senate Office Building, Hon. Debbie Stabenow, Chairwoman of the Committee, presiding.

Present or submitting a statement: Senators Stabenow, Brown, Klobuchar, Gillibrand, Donnelly, Casey, Cochran, Chambliss, and Thune.

STATEMENT OF HON. DEBBIE STABENOW, U.S. SENATOR FROM THE STATE OF MICHIGAN, CHAIRWOMAN, COMMITTEE ON AGRICULTURE, NUTRITION AND FORESTRY

Chairwoman STABENOW. Good morning. This Senate Agriculture, Nutrition and Forestry Committee will come to order.

Thanks very much to our witnesses today for their information, expertise. We thank all of our members being here at this very, very important hearing.

For centuries, commodity markets have been about connections between buyers and sellers. But those connections have changed—the days of "the pit" as the main form of trading are gone.

Today, the most important connections are fiber optic—information can be transmitted at nearly the speed of light. Powerful computers with complex programming have the ability to execute many thousands of trades in the time it takes two traders to use hand signals.

While advancements in technology have improved the markets in many ways, we are also faced with new challenges, which we are here today to discuss. As markets and trading change, so must the oversight. To put it simply: the men and women who have the public trust to oversee these markets must have the tools and resources to keep up with the markets they are overseeing.

With high-frequency trading in the news lately, it is important to remember there are significant differences between the securities and futures markets—both structural and regulatory. While the markets are linked, as we saw during the Flash Crash, some of the concerns raised about equities markets are not applicable to the futures markets.

Today's hearing will focus on some of the changes brought about by technology. Just as automated trading can take many forms, including algorithmic trading and high frequency trading—there are

many different perspectives on the costs and benefits of these strategies. We will hear some of those perspectives today.

We will also ask some questions: Has automated trading improved price discovery in futures markets? Does automated trading make it easier to manage risk for our farmers, ranchers and end users; or does it create risk? Are the regulators, exchanges, and other market participants sufficiently managing these new challenges?

These markets have changed dramatically over the years. For a 21st Century market, we need a 21st Century regulator. That means the CFTC needs the right authority and the right tools to ensure that markets are working. That means they need enough people, and it means they need up-to-date technology.

This hearing is not only a matter of oversight, but part of the effort to reauthorize the Commodity Futures Trading Commission, and affords us the opportunity to evaluate what changes might be necessary to protect our markets.

Thank you to the witnesses who have come here today, who represent an important cross-section of views. As we move forward, we will continue to listen to the concerns of all market participants, including farmers and ranchers; pension funds and mutual funds; and proprietary firms and consumer groups, to best ensure stability in today's futures markets.

Now, I will turn to my friend and the distinguished the Ranking Member of the Committee, Senator Cochran.

STATEMENT OF HON. THAD COCHRAN, U.S. SENATOR FROM THE STATE OF MISSISSIPPI

Senator COCHRAN. Madam Chairman, thank you for convening the hearing.

The Committee continues to explore today reauthorization of the Commodity Futures Trading Commission. It is an important opportunity for us, therefore, to hear from industry users of futures markets to get their suggestions, if there are needs that we should know about, to help improve the integrity of the process and the technology as well.

Over the years, we have seen commodity trading evolve from a person-to-person transaction into sophisticated, complex trades that span the globe and take only fractions of a second to complete. Automated trading has allowed the marketplace to grow and become more efficient.

But in light of these advances, it is important that we ensure the CFTC is discharging its responsibility as the primary regulator of futures markets.

There have not been reports of rampant abuses in the futures markets relating to high frequency trading, but we need to be sure that we have a framework of regulations and legal provisions in the statutes that guards against abuses and protects the integrity of this important marketplace.

Thank you.

Chairwoman STABENOW. Thank you, very, very much, Senator Cochran.

I am pleased to introduce our panel of witnesses that we have with us today. First, we have Vincent McGonagle, who is the Direc-

tor of the Division of Market Oversight at the Commodity Futures Trading Commission where he oversees the registration and oversight of trade execution facilities.

Since 1997, Mr. McGonagle has served as a variety of roles at the CFTC, most recently as a Senior Deputy Director of Enforcement in the Division of Enforcement. We thank you very much for your work.

Our second witness is a familiar face to the Committee. Welcome back. Mr. Terry Duffy is the Executive Chairman and President of the CME Group. Mr. Duffy has been a member of CME since 1981, the Executive Chairman since 2006 and took on the Chairman's role in 2012, also served as Vice Chairman of the CME Group Foundation in 2003.

Mr. Duffy was appointed by President Bush as a member of the Federal Retirement Thrift Investment Board, a position that he recently left. Welcome again. We are glad to have you.

Finally, we have Dr. Andrei Kirilenko, Professor of the Practice of Finance at MIT's Sloan School of Management. Before joining MIT, Dr. Kirilenko served as the Chief Economist at the CFTC for four years until December 2012, and again, we were much appreciate your expertise and willingness to be with us today.

We will move ahead. I think all of you know we welcome any written testimony. We will ask that your verbal testimony be limited to five minutes so we have enough time for questions, but we certainly welcome any additional written testimony you would like to leave with the Committee.

Mr. McGonagle, your testimony please.

STATEMENT OF VINCE MCGONAGLE, DIRECTOR OF THE DIVISION OF MARKET OVERSIGHT, COMMODITY FUTURES TRADING COMMISSION, WASHINGTON, D.C.

Mr. MCGONAGLE. Good morning, Chairwoman Stabenow, Ranking Member Cochran and members on the Committee. Thank you for the opportunity to appear before you today.

My name is Vincent McGonagle and I am the Director of the Division of Market Oversight at the Commodity Futures Trading Commission. I am pleased to appear before the Committee to provide an overview of the Commission's Concept Release on Risk Controls and System Safeguards for Automated Trading Environments.

Together with a number of rules applicable to trading platforms and market participants adopted since passage of the Dodd-Frank fact, the Concept Release is a proactive effort to evaluate technology driven changes in derivatives markets.

Over the past decade, automated order generating and trade matching systems have been enhanced. There has been a growth of interconnected automated markets and the role of humans and markets has changed.

The Concept Release contains a range of best practices, existing commission regulations, and potential concerns around automated trading for comprehensive public discussion.

The Commission solicited public comment on 124 separate questions what catalog existing industry practices. Fundamentally, the Concept Release asked whether existing risk controls are sufficient

to match trading technologies of modern markets. We focused on the automated trading environment looking at the progression of orders generated by the automated trading system or an ATS to the clearing firms that guarantee customer orders and then on to execution by trading platforms.

The Concept Release also addresses the big ATSs themselves. We sought comment concerning whether high frequency trading should be defined or otherwise classified as a registrant.

The Concept Release grouped 23 potential risk controls and other measures into four general categories. Pre-trade risk controls, post-trade reports, design testing and supervision of standards for the automated trading systems, and other measures such as market structure.

Pre-trade with controls are designed to prevent and minimize errors or disruptions from reaching trading platforms. This category addresses message rates, execution throttles, and maximum order sizes. Pre-trade risk controls could apply to some or all trading firms, the ATSs, clearing firms or trading platforms.

Post-trade reports will confirm receipt of an order or an executed trade or otherwise report an error.

The third category, system safeguards. We looked at safeguards for the design, testing, and supervision of automated trading systems. We also asked about kill switches effectively canceling all working orders that facilitate an emergency intervention in the case of a malfunctioning ATS.

Turning to market function and structure, we asked whether exchanges should publish market quality indicators describing trading activity and other associated metrics.

For market structure, we asked whether exchanges should amend their trade matching systems. An example listed includes whether trading should take place in a batch auction rather than the continuous trade matching system.

We received 43 comments to the Concept Release which raised a range of opinions. Some commenters questioned whether certain risk controls could slow creation or transmission of orders, creating a competitive disadvantage for firms that adopt them unilaterally.

Other commenters expressed concern about the speed of trading, including within exchange order books and suggested steps to reduce any potential advantages that come with speed.

Other commenters suggested, however, that further regulation in this space would quickly become obsolete as technologies evolve. Some pointed to industry-led best practices and safeguards rather than Commission regulation as an appropriate response.

The Commission has a responsibility to ensure preservation of price integrity within these critical markets. The Concept Release invited a public dialogue in order to make an informed recommendation to the Commission as to whether and what further role in the market, market participants, and the Commission should take in automated trading.

I will be happy to answer any questions. Thank you.

[The prepared statement of Vince McGonagle can be found on page 38 in the appendix.]

Chairwoman STABENOW. Thank you very much.

Mr. Duffy, welcome.

STATEMENT OF TERRENCE DUFFY, EXECUTIVE CHAIRMAN AND PRESIDENT, CME GROUP, CHICAGO, ILLINOIS

Mr. DUFFY. Thank you. Good morning, Chairwoman Stabenow, Ranking Member Cochran, members of the Committee, thank you for allowing me to express the views of the CME Group on a very important topic, high frequency trading. High frequency trading has been the focus of many negative comments, much of which has been based on misinformation when it comes to futures markets.

First, let me say that I strongly agree with regulators, in both the futures and the equities markets, that the futures markets are not rigged. To the contrary, the futures markets today are more open and accessible than ever before.

It is important to take a step back and discuss the market as a whole. Futures markets have evolved from a floor-based model to an electronic model at the demand of our customers who sought immediate execution and confirmation.

CME Group responded to its diverse and global customer base including our banks, hedge funds, farmers and ranchers, commercial producers and merchandisers, and other constituents.

Our innovative implementation of electronic trading opened the markets in a profound way. It increased liquidity and tightened bid/ask spreads to the benefit of our customers. They rely on deep liquid markets to achieve their risk management and investment objectives.

Without doubt, the increased speed of electronic trading has challenged us to ensure that our markets operate with integrity and are fair and open to all customers.

CME Group has been focused on this task for years. We have worked closely with this Congress, our regulators, and customers to maintain a level playing field.

We use a central limit order book. The identity of traders and firms is protected from disclosure on all their bids, offers, and execution reports. No one can see an order prior to them hitting our match engine and being made available on the order book.

Our market data is sent to everyone at once. While customers have several options in terms of how they can receive data from us, we do not restrict access. We maintain a complete and comprehensive audit trail of every message, every order, and every trade.

Orders entered via automated systems and the traders who operate them are identified in the audit trail. This allows us to monitor our markets which we do through sophisticated surveillance and the monitoring technology backed by experienced investigators.

CME promotes market stability through industry leading risk controls. These include pre-execution risk controls, price banding, stop-logic functionality, velocity-logic functionality, and messaging volume controls. These controls in all instances automatically reject irregular orders caused, for example, by an order entry or a malfunction of an algorithm.

I would like to talk a little bit about co-location. It is a topic that has received a lot of attention lately. In many cases, the coverage includes misinformation about how these facilities actually operate.

Co-location in our market provides equal access. It used to be that the benefit of speed from proximity was available only to trad-

ers who could buy real estate near an exchange or where he or she thought the server would be.

Because of co-location facilities, every trader has access to co-location. This includes everyone from small retail participants to the largest of Wall Street banks. Everyone in our facility connects with the same length fiber, so there are no unequal location advantages. This is one of the true benefits of our co-location facilities.

Finally, something that this Committee is deeply aware of, but has been largely ignored by the public, is that futures markets are very different from equities markets. Many of the complaints against high frequency trading in equity markets simply do not apply to the U.S. futures markets which have a completely different market structure.

The multilevel protections I described a few minutes ago are specific to our markets at CME. We think this structure strikes the right balance of regulating the market without inhibiting true price discovery.

The balance of regulation and market surveillance, along with deep pools of liquidity, give market participants the confidence they have come to expect as they rely on our markets to effectively manage their risk.

I look forward to answering your question this morning. Thank you.

[The prepared statement of Mr. Duffy can be found on page 27 in the appendix.]

Chairwoman STABENOW. Thank you very much.

Dr. Kirilenko, welcome.

STATEMENT OF ANDREI KIRILENKO, PROFESSOR OF THE PRACTICE OF FINANCE, MIT SLOAN SCHOOL OF MANAGEMENT, CAMBRIDGE, MASSACHUSETTS

Mr. KIRILENKO. Thank you good morning, Chairwoman Stabenow, Ranking Member Cochran, Committee members. I am honored to appear before you today at the hearing on high frequency and automated trading in futures markets.

It is not so long ago that futures were traded by human traders in face-to-face markets. An open outcry market was visible to the human eye. Traders had names, served designated functions, and occupied specific locations on the trading floor.

It was in the last decade that trading floors have been replaced by server farms and the traitors have been replaced by anonymous algorithms. Automated markets came with the promise of using faster and cheaper technology to drastically lower execution costs and improved price discovery for fundamental market participants, farmers, ranchers, manufacturers and pension fund managers.

For investors who want to buy or sell 100 shares or a couple of futures contracts, this process seems to have been realized. They can do it at narrow bid-ask spreads, greater market depths, and prices that can be discovered around the clock.

Then on May 6, 2010 came the Flash Crash. The events of May 6, 2010 were blamed on high-frequency traders, a new breed of secretive, hyperactive trading algorithms that take advantage of anyone trying to trade on size.

Within hours after the Flash Crash, my colleagues at the CFTC and I began looking into the trading activity in the mini-futures market which provides price discovery for the broad U.S. stock market.

We discover that on May 6, 2010 HFTs, as defined by us, did not cause the Flash Crash but did contribute to the extraordinary systemic market event which was triggered by a large sell program in the mini-futures executed over a short period of time.

Systemic implications of high-frequency trading in the mini-futures prompted us to study the inner workings of the HFT industry. We found that over a two-year period the HFT industry remained dominated by a small number of fast and aggressive incumbents.

These incumbents earned high and persistent returns while taking little risk. For some reason, competitive market forces did not seem to fully work and benefits of automated markets may not have been fully realized for everyone.

Instead of competing to provide best execution to customers, incumbent HFTs seemed to be engaged in a winner takes all arms race for smaller reductions in latency.

This explains why many regulators and policymakers decided to focus on latency type measures to slow things down, to put in speed bumps, or to remove the speed advantage of HFTs.

The subject of today's hearing, high-frequency and automated trading, lies at the intersection of four highly specialized fields, regulation, finance, technology, and data processing. I have specific recommendations for each of these areas.

In terms of regulation, I recommend creating a broad definition of automated brokers and traders, similar to what used be called floor brokers and traders in human-based markets. Regulators need to regain the ability to be on top of all the active traders and their markets.

In terms of finance, I recommend that regulators closely examine whether competitive market forces are eroding the high concentration of the HFT industry. The competitive market forces are not working among the black boxes. Regulators cannot continue to rely on industry-suggested solutions and need to step in.

In terms of technology, I recommend that automated exchanges report latency measurements through the market feed. Latency has become as important as prices and quantities.

In terms of data processing, I recommend that automated futures exchanges continue to broaden the use of short trading pauses and reopening auctions. This functionality is not without a cost but the benefits to public confidence especially for the slower public are worth it.

For the public to remain confident in automated futures markets, federal regulators need to demonstrate that they have upgraded their operations accordingly. This requires not only a substantial investment in new technology but an equally, if not greater, investment in human talent.

Regulators should also ask academia for help dealing with the new challenges that they face. We are here to be of use.

Thank you very much for the opportunity to testify before you today.

[The prepared statement of Mr. Kirilenko can be found on page 31 in the appendix.]

Chairwoman STABENOW. Thank you very much to each of you.

Dr. Kirilenko, let me start with you. You mentioned that some have said that we are now in an arms race as it relates to technology. When we look at these markets, on the one hand we do know it is different. It is not fragmented like the securities markets.

On the other hand, we are talking about greater and greater technology, and speed, and the whole question of whether or not the risk associated with higher trading speeds outweigh the benefits both in terms of managing risk and price discovery.

What would be your answer to that, looking broadly at the issue of speed versus what we are doing in these particular markets in allowing people to use these markets to manage their risk and for price discovery?

Mr. KIRILENKO. Senator, thank you very much for your question. It is a critical question in these markets.

What we found empirically by looking at trading in particular, very important futures contract is the HFT industry, the HFT firms who operate in the industry is highly, highly concentrated.

What happens when markets become concentrated like this is that it creates an environment, a winner takes all type of environment where instead of focusing on the needs of customers, intermediates start focusing on how they out compete their peers, if you will, because whoever is one nanosecond late is not going to get the trade.

Therefore, what we might be witnessing is potentially socially inefficient investment in technologies that do not necessarily benefit the end users.

Chairwoman STABENOW. Thank you. Would the smaller retail investor notice if the market slowed down the speed of trading by milliseconds or nanoseconds?

Mr. KIRILENKO. The thing that is very clear that automated markets are bearing the fruit of Moore's law, if you will. The technology, technological advances much, much faster and cheaper computing power is bearing the fruit of making these prices operate around the clock, of having the market quality indicators really improving across the board.

The bid-ask spread is much tighter, the depth is deeper, the volume is higher. For smaller investors, that may be what it is, they may be able to reap the benefits of that.

However, the issue is that it is not—the small investors when they execute a few contracts in futures may be benefitting but their pension fund managers who are trying to execute in the size to manage risks of their entire portfolio may be paying the cost that empirically could be higher.

It is not necessarily clear how much higher. We need to do at additional work on it. But on the whole the benefits may be disproportionally sort of shifting towards smaller trades and the few people who are inside the markets instead of a much, much broader constituency.

Chairwoman STABENOW. Thank you.

Mr. Duffy, you have highlighted the importance of CME's risk controls and I congratulate you on what you have been doing, messaging controls to maintain market stability, and so on.

Do you think the CFTC should require these standards for all market participants?

Mr. DUFFY. On the risk controls? For all market participants, it would be a little difficult to do, Madam Chairwoman. When you look at small participants trying to use these markets to hedge their crops, if you are going to put the same restrictions on them that you are going to do on a large participant, the cost to them is going to be extraordinary.

That is why us as a good exchange, as a designated contract market, we oversee those markets for those smaller participants. That is why it is critically important.

When you look at what is going on today and let me just counter to what the doctor said a little bit, futures markets are about risk transfer, not about capital formation. There is a complete difference in what they do.

Chairwoman STABENOW. Right.

Mr. DUFFY. Risk transfer is critically important to keep the spreads in line so the participants can execute at the cheapest possible price including those that are using them for risk transfer.

The people that are trading high-frequency which are trading for the bid-offer are keeping the spreads very tight does a service to the people that are doing the risk transfer.

High-frequency traders for the most part are there to try to capture bid-offers. Risk transfers are buying bids and selling offers. That is what they do and they do it at the most cost-effective rates.

As far as the risk controls, it is critically important that they are all in place. I agree with both the doctor here on that. But what is more important here is the cost of execution for the participants.

Chairwoman STABENOW. Dr. Kirilenko recommended that CME build on its success and, quote, broaden the use of short trading pauses and other risk controls. Would you agree with his assessment on that?

Mr. DUFFY. On our risk controls, we, I mean the doctor said it in his testimony, the Flash Crash. He was correct that HFTs did not create the Flash Crash, and I think there is a little bit of miscommunication who actually did create the Flash Crash.

As you know, there were major macro events going around Europe at a particular time. There were big issues facing this country. All of a sudden the market went down precipitously and somebody was trying to do a large hedge and then the market fell and that happens.

It came back, and the person who supposedly caused this large Flash Crash actually sold on the way back up. I agree with the doctor it was not HFTs and it was not a large asset manager that caused it. It was factors from all over the world but our technology with the stop logic functionality, we stopped.

In the securities world, Senator, you may know that Accenture went to a penny that day. We do not trade Accenture. Because of stub quoting, the Flash Crash allowed markets like that because of the market structure to go to a penny, we have what is called

stop logic functionality which, after so much, the market stops were six seconds, replenishes liquidity.

We have velocity logic functionality. If there is too much velocity at one time, we will stop the market. If there is a big directional change in the market, we will also slow down the market and pause it.

We have multiple controls in place to make sure these things do not happen.

Chairwoman STABENOW. Thank you. I have additional questions. I will wait for additional rounds.

Senator Cochran.

Senator COCHRAN. Madam Chair, thank you for convening this hearing. Let me ask Mr. Duffy. Are there any changes in the law, the underlying law, recommended by the Commission now to try to address any kind of activity that should be disciplined more tightly or supervised more closely to protect the interests of the users of the markets?

Mr. DUFFY. First, Senator, I am unaware of any particular issues or laws that have been changed from what has already been public recently that the Commission has put forth. But what I will say is critically important, the most important thing is that if somebody is acting nefariously in the market to the detriment of the participants, they should be punished to the degree, whatever the law will provide for.

Senator COCHRAN. Well, does the law provide sufficient safeguards to achieve that goal?

Mr. DUFFY. Yes. It does.

Senator COCHRAN. Thank you.

Chairwoman STABENOW. Thank you very much.

Senator Brown.

Senator BROWN. Thank you, Madam Chair, and thanks to the witnesses. Mr. McGonagle, nice to see you again. Thank you for your testimony earlier in our commodities issue.

As we know, in the world of high-speed trading, time is measured in microseconds, millionths of a second or milliseconds, thousandths of a second. A significant portion of Dr. Kirilenko's testimony focuses on latency, and I want to ask Mr. Duffy a question on latency and recall some of your statements and ask you to sort of explain.

The Wall Street Journal highlighted, quote-unquote, order latency when trade information is routed to the parties to a trade before they post to the rest of the market.

This informational advantage, if you will, allows high-speed trading firms to see which way prices are heading, as you know, and to trade ahead of the rest of the market on a different futures exchange, exploiting arbitrage opportunities in mere milliseconds.

Your testimony today says that CME's market data quota is sent to everyone at once. On April 23, Mr. Duffy, you told Bloomberg that, quote, latencies have been shrunk dramatically, but I have heard they may remain important contracts like the crude oil complex.

Has CME addressed latencies across all futures contracts or are these delays just shorter or are they gone completely?

Mr. DUFFY. All of our market data comes out of one pipe, sir, and then the way you decide to acquire that is up to you. There are multiple ways to receive market data. It does go out all at once.

What you are referring to, sir, I believe in the Wall Street Journal article that was written over a year and a half ago is where a participant would receive his confirmation of the trade but the market data did not hit the tape yet.

He knew he had the trade. He was the only one who knew he had the trade. The rest of the world did not know he had the trade yet. That was what the Wall Street Journal article cited.

We have shrunk that latency dramatically about market data to market confirmation. You have to understand, sir, when you have multiple messages coming from multiple participants coming out at one price, it could slow that particular system down quite, not quite a bit, a millisecond, and we have shrunk that dramatically.

In most cases, sir, the time of market trade and market data come out instantaneously. There are situations where there could be a lag of a millisecond depending on what the scenario of the market conditions are. But that is totally separate from the way we distribute our market data. Everybody gets their market data at the same, at one pipe. They decide how they receive it. There is no differences.

Senator BROWN. To clarify that, that microsecond or those few microseconds or a millisecond of delay, does that advantage one?

Mr. DUFFY. No, sir, because the only person that knows that he has gotten the trade is himself. Correct. In our world, if he was—it is not like securities where he can go to an exact market such as IBM stock being traded on 13 different venues and potentially see a different price than what he received to add to that benefit.

We do not have that in that world, sir. If you are trading a Euro dollar futures contract on the CME Group, you get your price confirmation but the market data had a millisecond lag, yes, you could go to another market and execute. It does not mean you are going to be right because it is not the same exact market.

Senator BROWN. You had said earlier that CME had said that this issue would be addressed by the end of last year. You say you have addressed it?

Mr. DUFFY. Our issue with market confirmation and market data for the participants is down to a millisecond. In most situations, it actually comes out at the exact same time.

Senator BROWN. Mr. McGonagle, if you would comment on this. The CFTC was not in the process of examining this issue is my understanding when it came to light last year. Do you have comments on the back-and-forth of Mr. Duffy and me or CFTC's role? Dr. Kirilenko, if you would weigh in too and your thoughts about this.

Mr. MCGONAGLE. Thank you, Senator. In evaluating the concept or at least this conversation surrounding latency, Commission consideration could focus on sort of the quality of the information access, how much information about particular trading in particular contracts are their latency issues on a contract by contract, the Commission could certainly consider that.

The Commission is also considering, as part of the Concept Release, the idea, this concept and regulation about impartial access.

All market participants should have the same ability to access the markets equally.

Whether or where the latency might cause some disruption in that ability of market participants to get information, I think could be something that the Commission could consider.

Mr. Duffy is talking about the ability to trade. That information about the trade is important information and we want to make sure that in evaluating these markets that the information is readily available to all market participants without disadvantage.

Senator BROWN. Dr. Kirilenko, your thoughts.

Mr. KIRILENKO. Thank you very much, Senator, for an excellent question.

Your concerns and the public concerns about latency are fully justified. That is why I recommend that instead of, either the public deserves much greater transparency about what is going on inside his market. I think the latency should be reported in some form.

There are various types of latencies so that the automated exchanges which, as we know, measure it with great precision could be held accountable and the public could understand what is actually going on.

It may or may not be an issue but at least the public would know. We could also see whether different policy measures that are being suggested and implemented actually do have an impact as people think they do.

An automated exchange is a highly, highly complex automated system. It has latencies because any automated complex system has latencies in it. Latency is not a number. It is not a millisecond. It is typically a distribution and not a bell-shaped one. The public needs to understand that and also needs to understand what to look for and how to measure what is being going on.

Senator BROWN. Thank you.

Thank you Madam Chair.

Chairwoman STABENOW. Thank you very much.

Senator Chambliss.

Senator CHAMBLISS. Thank you very much, Madam Chair, and let me just say off the top that with respect to your concern about the difference in the risk that participants in the market taken as well as Senator Cochran's question, there is a major difference between one of our farmers and ranchers who is driving from field to field and during the course of that checks the market and wants to make a trade and the a major integrated company who is going to be trading hundreds of millions of dollars on contracts.

We thought we had made the right kind of changes in Dodd-Frank but frankly we did not. I am going to be dropping a bill today that we have worked with industry, with CFTC as well as members of this Committee on—and I will be talking to the chairman about it later—that seeks to correct the end-user exemption that needs to be granted particularly to our farmers and ranchers who they deal in a different world than a major integrated company. So we will talk more about that later.

Mr. McGonagle, CFTC officials have stated in the past that high frequency trading firms should be required to register so that you know who they are. Now, what information specifically could be

gathered from a registration regime that is not available to the Commission today?

Mr. MCGONAGLE. Thank you, Senator. Currently market may be registered to the extent that they are an automated trading system or fall within some definition of what people have for high-frequency trader but they might otherwise be registered with the Commission in some other capacity.

In evaluating a new registration regime, we want to take into consideration whether we have already captured the types of traders that we are interested in terms of obligations that they might have for information reporting, the level of responsibility back to the agency.

One proposal or suggestion that we have in the Concept Release is whether we should classify floor traders, use the floor trader definition for high-frequency traders. That is something we are considering at the staff level with respect to a recommendation back to the Commission.

But if there is a registrant, they will have enhanced reporting responsibilities to the agency. We will have a better idea about who these entities are and the question is whether we already have that information in a usable form and whether this additional registration requirements, the benefits of those requirements otherwise fit within a regulatory structure.

Senator CHAMBLISS. Mr. Duffy, you just heard that answer and you talked a little bit about the information that CME Group collects on firm's identities. Would registration in and of itself generate more information than what you receive on a trader today?

Mr. DUFFY. No, Senator, it would not. I mean, today we have information on every market participant, every order; and every person is identified with all of their activity in CME Group.

We tag traders in two different tags, basically what is called Tag 50 for a regular trader, and then for an automatic trading system we have another tag number for it. We have all that information today that is accessible today to the CFTC.

Senator CHAMBLISS. Okay. Again, Mr. Duffy, in your testimony, you stay, and I quote, "many of the recent complaints against high-frequency trading and equity markets simply do not apply to the U.S. futures markets". Would you elaborate a little bit on the differences.

Mr. DUFFY. Thank you, Senator, I would be happy to.

As I said in my testimony, when you enter an order into the CME system, no one knows you entered that order but yourself until it hits our match engine, and then the order, the transaction is complete.

In some of the allegations on 60 Minutes and in the book about Flash Boys, if you recall, the allegation was there was an order sent to a particular entity. Everybody could see it and then they race to the 13 other exchanges that traded in front of it and then offered a price a penny higher.

Well, that would be literally impossible in our world the way the market structure handles it because no one knows about that order but us. Also in a vertical silo which is what we operate in the futures market, people do not have the ability to go outside of our

walls to go race customers to different venues to beat them to that trade.

As I said, what is critically important, if, in fact, that is going on in the securities world, that should be punished to whatever the law would allow people to punish them for because that is completely unacceptable.

But in our world, we do not see how that possibly can happen. Now, someone says, could front running happen in your business? It can happen in the way they described it in 60 Minutes. People can always act nefariously on behalf of a client and do something that we obviously police for on that activity.

Senator CHAMBLISS. If that did happen, if you had a front runner, if you do not pick it up on the front end, are you going to pick it up eventually?

Mr. DUFFY. We will pick it up through patterns. We will pick it up through many different surveillance systems, Senator, that we have put in place over the last several years. We feel very comfortable that type of activity is not going on in our marketplace.

Senator CHAMBLISS. Thank you.

Chairwoman STABENOW. Thank you very much.

Senator Donnelly.

Senator DONNELLY. Thank you Madam Chair, and thanks to all the witnesses who are here today.

Mr. Kirilenko, are there latencies that continue today that you see in the markets on a constant basis?

Mr. KIRILENKO. Thank you very much, Senator, for this question.

Again, I think that you are fully justified in thinking of latency as an important indicator that really needs to be measured and be made available to the public.

There is some reason preliminary work that indicates that latency is not a number that it is a distribution of numbers, and there is a significant degree of randomness in the way latency accumulates within the system.

Therefore, when we think of time priority, we need to think of it, this time priority being not as exact but somewhat random depending on how a message hit the exchange, depending on how long it took for risk safeguards to process it, depending on where it hit the bus and so forth. It may be delay even more or less. Latencies do accumulate within the system.

Senator DONNELLY. Mr. Duffy, in your markets, do you keep an eye out for latencies?

Mr. DUFFY. We do, sir. As I said earlier, we are down two microseconds on certain issues but there is also a speed of light issue that there is not much anybody can control.

If your server is sitting in Chicago and you want to make a trade from Los Angeles, there is a difference between Los Angeles and Chicago as there is from New York to Chicago and conversely both places.

There is a potential speed of light issue that I do not think anybody could overcome unless they figure, I do not know how they could figure that out. I think the doctor is right. There are inherent latencies in all technologies.

Senator DONNELLY. If you see a latency issue occur, is that then made public that everybody knows it or how does that work? Do

you work to just fix it and keep it in effect within the house or does that then become public that, hey, we found that there is this latency here; this is what we are trying to do?

Mr. DUFFY. I can tell you, Senator, that when we took our systems from trading in minutes to seconds to milliseconds to microseconds, I do not think we put out press releases or anything else along the way. We just continued to make the market more efficient.

You know, to tell you a quick story, when you look even at the insurance business, there are commercials on television today, you can get a quote from your insurance company for 15 minutes or less and then the next commercial a guy says you can get it in two minutes or less.

Speed is something that the American public and the world is very used to and wants more of it. There are certain limitations to all speed and I do not think there is anything you can do about it. We have narrowed it down to the smallest of millisecond.

Senator DONNELLY. Do those latencies that are there, does that create an opportunity for any of the HFT firms to get a market advantage?

Mr. DUFFY. No, I do not believe it does because if they, first of all, you have to be right a market regardless. You do not have anywhere else to run where the price is different. Where HFT's could potentially benefit, as I said earlier, is in a fragmented marketplace where there are 13 different venues of trade for the same product that might have an arbitrage inherently built in them, well, that is where their speed could actually have an advantage.

But when you have a product that is traded all under one roof, it is very difficult to have an advantage.

Senator DONNELLY. When we talk about the equities market where it happened and you mentioned, hey, there are 13 different markets, they can see and then try to get ahead of it. When the orders are placed in your markets, people from other firms and such cannot see that is happening before hand?

Mr. DUFFY. First, to be clear, I did not say that. 60 Minutes and Michael Lewis said that.

Senator DONNELLY. All right. Understood.

Mr. DUFFY. In our markets, what I had said is that when you enter an order nobody knows who put that order in but yourself until it hits our match engine.

Senator DONNELLY. Okay. Mr. Kirilenko, when you look at these markets, what is the biggest danger that you see still now existing in his trading?

Mr. KIRILENKO. I think these markets are incredibly complex, interconnected, automated systems. Perhaps the biggest danger lies in this interconnectedness where a trade executed in one part of the market could be transmitted across the entire universe very, very quickly by automated technologies, by algorithms that police for a small price discrepancies and the whole system becomes affected by that.

I think the interconnectedness and inter-linkages between these markets I think is what is the biggest issue. I think individually exchanges and regulators looking at them are aware of some of the

things that they are facing. But I think this inter-linkage is something that requires a lot more attention.

Senator DONNELLY. Okay. Madam Chair, thank you and thanks to all the witnesses.

Chairwoman STABENOW. Thank you very much. I do believe we have Senator Casey coming, but at this point, I am going to proceed and if Senator Cochran has questions as well.

Mr. McGonagle, could you talk from the standpoint of the CFTC and what is next at this point? Are you considering proposing a rule on automated trading practices and how do you think that the CFTC will proceed?

Mr. MCGONAGLE. Thank you, Chairwoman. The Commission currently has taken, we have taken the comments back at the staff level. The staff is evaluating those comments in order to come up with a recommendation.

While the Concept Release is not a rule writing, it can be a precursor to a rule. Our expectation is that we will evaluate each of these measures that we have put forward and become back to the Commission with a recommendation.

But we need to do a thoughtful and diligent review of these issues to see whether or where the Commission action is warranted. A rule could be recommended but we are not at that stage at this moment.

Chairwoman STABENOW. Mr. Duffy, interesting when you were saying the public wants higher speeds. I do not know if that is really true or not.

This whole thing is quite extraordinary in terms of speed, and I do not know from a public standpoint if people really are asking for more speed. I think they want confidence and they want markets that they feel are stable and that they can use appropriately.

But my question both to you and to Mr. McGonagle relates to the ability of the CFTC to keep up. If we are going to see this moving faster and faster at a time when the CFTC does not have the technology that is comparable to what is happening in the private sector. We have given tremendous responsibilities to the CFTC without adding the additional staff necessary to help with that.

If we are going to say that this should be a model where it is not about direct regulation but more about working with the industry in a self-regulating mode, there has to be some capacity for oversight here that is equal to what is happening in the marketplace.

I'm wondering, Mr. McGonagle, just from your standpoint, what would the agency do from a technology standpoint, what would you be able to do if you had additional funds?

Mr. MCGONAGLE. Speaking specifically to the automated trading system environment, additional technology funds could, for example, be used. We need to supplement the staff that we have. We have very well-qualified staff who are conducting examinations and surveillance. But we would need to increase those staff levels so they can perform the analytics on the data that we receive.

We would increase the data that we do receive from the exchanges. The exchanges have a wealth of information that is available to them on a buy exchange basis. We pull in trade order data on a T+1 the day after basis. But we would look for messaging

data, more discreet, nuanced information about these particular trades that could inform us on our regulatory obligations as well as how we conduct enforcement.

We would see multiple benefits just in increasing technology in this one particular area. I mean, the Commission's resource needs I think have been pretty well documented. We do face substantial staff shortages within DMO and within other divisions that I have worked at, Division of Enforcement.

We do appreciate consideration of our resources but I defer more to the Commission in terms of how we could allocate resources, additional resources, if provided. But we certainly have significant opportunities that we could address if we had more people and we had more technology.

Chairwoman STABENOW. Mr. Duffy, you and I have talked about this before, about user fees and so on. I am wondering, from your standpoint, would you support using funds gathered from enforcement cases to pay for agency expenses like technology and staff?

Secondly, what if the agency funded itself with broader-based fees, not only on transactions but looking at other things, without harming the market?

Mr. DUFFY. A couple of things if you do not mind. From an enforcement issue, today I believe all of that money has to go into the general Treasury of the United States and then gets allocated through their appropriations process.

I think that is to keep away from the conflicts of interest of any particular entity feeling that participants are only being pressured or fined in order to fund an agency. But I do believe that there could be a small portion of enforcement findings to help fund an agency which would make sense.

Now, what that percentage is would be up for the government to always decide. But if you looked at 10 to 20 percent, in that neighborhood, you could probably fund the CFTC in full if you were to use that portion of the enforcements to do so.

I am not suggesting it is a good idea or bad idea but I think that should be at least looked at.

Second of all, on what Mr. McGonagle said, we do have a wealth of information that we could share with the Commission, which we do share with the Commission.

To give you an example, when the doctor referenced the Flash Crash, I testified before a Committee here in the Senate and we had every trade broken down in three hours and gave it to the CFTC in the same night.

I testify two months later. The SEC still did not have their information because they do not have a consolidated audit trail. That is a big problem for that world.

We have done a lot to help with the enforcement and protection of our marketplace. What is the most important thing for us is to have the credibility and to have the public confidence in the marketplace.

To give you an example why I think that not speed is important but market efficiency is important, in the agricultural community alone when you look at the marketplace over the last year when the price of corn almost went in half, we were able to provide deep,

liquid pools of liquidity for farmers and ranchers and others to use that as a hedge vehicle.

To protect that because their input costs are so high, because of land, fees, and other things. That was a great benefit these futures markets provide. I did not want to leave without saying that.

I think that we do have a lot of the things in place to help the agency. I cannot put their budget together for them. You know, I think it is important for the CFTC to put forth a budget like everybody else does to see where monies are going to be appropriated, and then come to you to decide if you can get Congress to agree to give some enforcement funding so they do not have to rely on taxpayers alone.

Chairwoman STABENOW. You would agree we have dramatically increased their responsibilities?

Mr. DUFFY. Yes.

Chairwoman STABENOW. We have not dramatically increased technology?

Mr. DUFFY. Madam Chairwoman, as you know, I am a very big proponent of the Commodity Futures Trading Commission. I do not believe the CME has a credible business if we do not have credible regulator. I want to make sure that they are the envy of the world as far as regulation goes.

Chairwoman STABENOW. Thank you, Senator Cochran, did you want to ask a follow-up? I know we have Senator Casey here.

Senator COCHRAN. No, Madam Chair, and I do not have any other questions. Thank you very much for your cooperation with our Committee.

Chairwoman STABENOW. Thank you, Senator Casey, welcome.

Senator CASEY. Madam Chair, thank you very much. We appreciate your testimony, sir. I am late for your individual testimony but grateful for the time you give us with questions.

I guess I wanted to start with Mr. McGonagle. I want to ask you in particular about the recommendations and suggestions you would make for us. I know you may have already walked through this.

What do you think we should be most concerned about with regard to the oversight responsibility of this Committee?

Mr. MCGONAGLE. Senator, particularly as it relates to the automated trading system environment, I think that it would be helpful to keep attention on CFTC as we evaluate these issues and come forward with a recommendation.

Our responsibility is to ensure that our markets have integrity, and the interaction with this Committee about how we are fulfilling that responsibility I think is important. How we come about with our recommendation on the Concept Release, should we articulate that further rules are required, further communication with this Committee on those points I think would be helpful.

Senator CASEY. With regard to rules that are prescriptive in nature, would those kinds of rules leave some of these entities or some of the practices out of regulation? What is your sense of that?

Mr. MCGONAGLE. The concern that we have heard at least in comments is that prescriptive regulations in this area can be quickly outstripped by changes in technology.

Proposals that have come back to the Commission are that we should have more of a principle-based approach. I think the challenge that we have is sort of flexibility versus clarity. Principles give flexibility but they could be challenged or subject to questions surrounding clarity.

We want to make sure that our market participants have a level playing field and that they understand the rules on that field. I think that is just a challenge always.

We have some prescriptive rules in our system of regulations; and we have some principle space, particularly supervision rules. I think evaluating how those applied in our past history and going forward and looking at where in this Concept Release recommendations would be helpful, would help dictate whether we should go principles versus prescriptive.

Senator CASEY. I know one of the things that we have to focus on here are best practices but I wanted to ask you. Often we have in our oversight responsibility, discharging that responsibility, we have a lot of ideas about what an agency should be doing and what we hoped they would be doing.

But we do sometimes engage in what folks at the state and local level would say unfunded mandates, meaning thou shall do the following and good luck getting it done without resources. You may have already covered this and I just was not able to be here.

But in order for you to do the job we would hope you could do in this area, what, if any, resource means do you have?

Mr. MCGONAGLE. Senator, if I can talk a little bit then about resources just to give some perspective where the Division of Market Oversight is, in 2011 the Division of Market Oversight had a staff of about a 126 staff people, responsible for registration obligations, enforcement of the rules, our examinations staff as well as surveillance.

There were 16 designated contract markets within CFTC's jurisdiction that DMO had control over. Currently, we have 40 registrants, 40 registered entities, a swap execution facility, designated contract market, swap data repositories, and foreign boards of trade that have some registration status.

Another 30 applicants are seeking registration status. DMO could be responsible for upwards of 70 different registered entities comprising a much broader jurisdictional swap than we saw in 2011. My current staff load is about a 109.

In evaluating what our responsibilities are like any agency, any business, we would look at our priorities, where do we get the most benefit, where can we have the most leverage.

In looking at the Concept Release, I think of where there are areas if we were to make a recommendation that we believe would be the most impactful because again our goal here is market integrity and we want to make sure that we are doing our job and that the markets are doing their job.

Senator CASEY. I know I am out of time but maybe I will submit some questions for Mr. Duffy, for both witnesses because one question I have was about how we get the balance right between focusing on risky activities but also making sure that we are not over regulating so that hedger's, bona fide hedgers and end users are

not adversely impacted. But I am out of time but I will submit that.

Chairwoman STABENOW. Thank you. Important questions.

Senator Donnelly.

Senator DONNELLY. Thank you, Madam Chair.

Dr. Kirilenko and this is a little bit off of the direct topic—do you see the front running opportunity that has been talked about a lot recently in the equities markets, do you see that continuing in the equities market? What is the best way in your mind to correct that?

Mr. KIRILENKO. I think the equities market is really quite different in terms of fragmentation.

Senator DONNELLY. I understand I was just wondering if——

Mr. KIRILENKO. Whether or not it is continuing is an empirical question, Senator. I think it is a matter for the regulators to really understand how their markets are working to really get that consolidated audit trail to really get their staff to understand how it works and find the evidence of that.

I have done little empirical work on securities markets. I am familiar with them but I would like my remarks to be based on experience and facts.

Senator CASEY. Sure. Well then, Mr. Duffy or Mr. McGonagle, both of you are extraordinarily experienced. Are there things that you look at and you say, if in a perfect world if they could change this or this it might make for more secure equities market as well.

Mr. DUFFY. You know, I will give you my opinion only because I cannot help myself.

Senator CASEY. That is why I asked you.

[Laughter.]

Mr. DUFFY. I run a futures exchange.

Senator CASEY. Right.

Mr. DUFFY. I am 35 years running in the futures business. I am not a securities expert. But what I do understand is price discovery and how price discovery happens, what is the best way to get price discovery.

When you have a fragmented marketplace and you have almost half of the U.S. equity market dark in nature, it is really difficult to find what is the actual value of it.

When you have multiple exchanges trading the exact same product and you have Reg NMS requiring people to go to the best bidder offer, it is really difficult to say who has the best bidder offer at any given time, sir, because the markets are moving so quickly.

One exchange could be showing IBM at a certain price plus a penny, another exchange that is the best bid and offer, a half a second later the other exchange is the best bid and offer, you have not done working your order at the first exchange yet.

I think the system itself needs to be looked at, streamlined, and more efficient. I do not think it is HFTs that are the problem. I think market structure is the problem, sir.

Senator CASEY. Have you detected, Mr. Duffy, in your markets, you have indicated, look, it cannot happen or—I do not want to paraphrase for you. But you do everything you can to make sure it does not happen in your markets.

Have you detected, do you see at times in your systems that some organizations have tried to figure out how to do that? I mean can you see that?

Mr. DUFFY. The only way it can happen, sir, and just to make sure we are perfectly clear on this. The only way it could happen is if someone is acting on your behalf. You have given them the ability to act on your behalf to enter an order.

They decide to enter an order for themselves first, yours second. That is the way it can happen in our world, and that is against the law, and we rigorously police against that type of activity.

But on an electronic system if you are to enter your order, Senator Donnelly enters an order into the CME system, you are the only person that knows about that order so it is impossible to front-run something that nobody else knows about.

Senator CASEY. Okay. Mr. McGonagle, in today's markets where millions of dollars can change hands in milliseconds, we have a system where if there are violations, the maximum penalty is $1.4 million? Do you think that is enough to deter manipulation?

Mr. MCGONAGLE. Thank you, Senator. The enforcement penalty standard looks at per violation and I think an evaluation of how many violations have occurred is part of the rubric that the Division of Enforcement has.

From our perspective, we enforce authority that we have, and I would have to defer to others about whether more penalties are appropriate for deterrence or there are other mechanisms available. But looking at a penalty per violation increased recently to 1 million per violation, that is our current mandate.

Senator CASEY. Okay. Well, I want to thank the witnesses for being here.

Thank you, Madam Chair.

Chairwoman STABENOW. Thank you very much.

As we close, I do have one other question as a follow-up to what Senator Donnelly was talking about, and this regards disruptive trading practices.

Mr. McGonagle, if you could tell us as we are looking at the Commodities Exchange Act, as we are looking at CFTC reauthorization, we gave the CFTC more authority under Dodd-Frank, to go after practices like spoofing and banging the close and in some cases changed the criminal standard from intent to reckless disregard.

Do you think we need to revisit that? Do you think the CFTC has sufficient authority to go after market participants who are knowingly or recklessly disrupting the market?

Mr. MCGONAGLE. Thank you, Chairwoman. The CFTC recent increase in authorities through substantial manipulation authority as well as the new disruptive trading practices, those investigations and associated litigation are now starting to come on line.

We see the mandate that the Division of Enforcement has. We take that very seriously and we think the markets do as well. We are prepared to work within the jurisdiction that we have. Further strengthening the manipulations standard would have costs on market participants. I think for clarity that they would have to be evaluated, and I am not in a position to sort of offer another proposed recommendation. I think the authority that we have is very

useful to the agency and we are in the process of effectively utilizing it.

Chairwoman STABENOW. Thank you.

Mr. Duffy, did you want to respond to that?

Mr. DUFFY. No. I think that was well said.

Chairwoman STABENOW. Okay. Well, thank you very much we are about to have a vote on the Senate floor. Let me thank each of you for coming. This is an incredibly important topic.

As we consider all the benefits of technology, we have got to make sure that market oversight is keeping up. That is our job. We need to work together to ensure the markets are safe for trading and that the regulators have the resources necessary to keep them safe.

Any additional questions for the record should be submitted to the Committee clerk five business days from today. That is five p.m. on Wednesday, May 21, and the meeting is adjourned. Thank you.

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

A P P E N D I X

MAY 13, 2014

OPENING STATEMENT

SENATE COMMITTEE ON AGRICULTURE, FORESTRY, AND NUTRITION

"HIGH FREQUENCY AND AUTOMATED TRADING IN FUTURES MARKETS"

Tuesday, May 13, 2014 -10 a.m.

328A Russell Senate Office Building

- Madam Chairwoman Stabenow and Ranking Member Cochran thank you for calling this hearing today.

- As part of our overall discussion of CFTC reauthorization, today we are discussing a relatively new facet of the futures market, high frequency and automated trading.

- I appreciate all the work staff and commissioners have done to inform the committee on high frequency trading and the benefits and risks it may pose.

- I also appreciate the efforts to gather input from industry regarding what steps, if any,

need to be taken to regulate these types of trades.

- I believe it is important for the CFTC and this committee to carefully weigh the cost of any new regulations and thoroughly examine any potential harm that may be done to end users through enforcement of those regulations. The costs to CFTC for compliance, including additional staff, for new regulations needs to be considered as well.

- As I've said before, commodity futures trading is becoming increasingly important to the agriculture community, especially in states like my home state of South Dakota with agriculture as its number one industry.

- Because of current lower commodity prices, managing risk is even more important to our farmers and ranchers, grain elevators, cooperatives, and suppliers who utilize the trading tools under the jurisdiction of CFTC to better manage their risk.

- I look forward to hearing from our panelists, and their perspectives on the benefits and challenges posed by high frequency and automated trading.
- Madam Chairwoman, thank you.

WRITTEN TESTIMONY
TERRENCE A. DUFFY
EXECUTIVE CHAIRMAN & PRESIDENT
CME GROUP INC.
BEFORE THE
SENATE COMMITTEE ON
AGRICULTURE, NUTRITION AND FORESTRY
MAY 13, 2014

Good Morning, Chairwoman Stabenow, Ranking Member Cochran, and Members of the Committee. Thank you for the opportunity to testify today regarding high frequency trading in the futures markets. I am Terry Duffy, Executive Chairman and President of CME Group.[1]

High frequency trading has been the focus of substantial negative comments—much of which has been based on misinformation when it comes to futures markets. First, let me say that I strongly agree with regulators -- in both the futures and equities markets -- that the financial markets are not rigged. To the contrary, the futures markets today are more open and accessible than ever before.

It is important to take a step back and discuss the market as a whole. Futures markets have evolved from a floor-based model to an electronic model at the demand of our customers, who seek immediate execution and confirmation. CME Group responded to its diverse and global customer base including banks, hedge funds, asset managers, corporations, farmers and ranchers, commercial producers and merchandisers, and other constituents.

Our innovative implementation of electronic trading opened the markets in a profound way. It increased liquidity and tightened bid/ask spreads to the benefit of our customers. They rely on deep liquid markets to achieve their risk management and investment objectives.

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[1] CME Group Inc. is the holding company for four exchanges in the U.S.: Chicago Mercantile Exchange, ("CME"), Board of Trade of the City of Chicago Inc. ("CBOT"), New York Mercantile Exchange, Inc. ("NYMEX"), and Commodity Exchange, Inc. ("COMEX") (collectively, the "CME Group Exchanges"). The CME Group Exchanges offer a wide range of benchmark products across all major asset classes, including derivatives based on interest rates, equity indexes, foreign exchange, energy, metals, agricultural commodities, and alternative investment products. The CME Group Exchanges serve the hedging, risk management, and trading needs of our global customer base by facilitating transactions through the CME® Globex® electronic trading platform, our open outcry trading facilities in New York and Chicago, and through privately negotiated transactions subject to exchange rules.

Without doubt, the increased speed of electronic trading has challenged us to ensure that our markets operate with integrity, and are fair and open to all customers. CME Group has been focused on this task for years, and we have worked closely with Congress, our regulators and customers to maintain a level playing field. We have created a market structure of which we are very proud. In particular:

- We use a central limit order book. A single integrated market allows for concentrated liquidity in one transparent location.
- The identity of traders and firms is protected from disclosure on all bids, offers and execution reports.
- Bids and offers are available to all participants and matched according to transparent exchange algorithms.
- Our market data is sent to everyone at once. While customers have several options in terms of how they can receive data from us, we do not restrict access. Having multiple connectivity options makes our markets accessible to a broader array of participants.
- No one can see orders prior to them hitting our match engine and being made available on the order book.
- We maintain a complete and comprehensive audit trail of every message, order and trade. Orders entered via automated systems and the traders who operate them are identified in the audit trail.
- We continually monitor our markets through sophisticated surveillance and monitoring technology backed by experienced investigators.

In addition to having built a market structure that promotes liquidity, efficiency, and accessibility to customers from banks, hedge funds, commercial producers and merchandisers to farmers and ranchers, CME promotes market stability through industry leading risk controls. We have developed an array of capabilities to manage risk and volatility and mitigate market disruptions, including those that might be caused by high frequency trading. These include:

- **Credit controls.** Pre-execution risk controls are provided that enable clearing firms to set credit limits for their executing firms. Our credit controls, which every clearing firm is required to use, can include order blocking, order cancellations and email notifications, which can be set at varying thresholds. We also employ a tool called Cancel on Disconnect that will cancel all resting orders for a market participant that gets disconnected from our system.

- **Price banding.** All orders are subject to price verification. Bids at prices well above or offers at prices well below the market fall outside of that contract's "band" and are rejected.

- **Maximum order quantity.** Every product has a pre-defined maximum quantity per order. This step ensures that the order is not exceeding this limit. If the maximum quantity is exceeded, the order is rejected.

- **Messaging controls.** These controls limit the rate at which firms can submit mass quotes and can block orders from entering the system if volume thresholds or order quantities are exceeded.

- **Stop-logic functionality.** Stop logic can automatically halt the market for a predetermined time period in order to help prevent extreme price deviations. When it was triggered on May 6, 2010, stop logic reversed the course of the Flash Crash by halting the market for enough time for liquidity to be replenished.

- **Velocity-logic functionality.** This is designed to guard against rapid price spikes. It is triggered by a pre-specified price movement over a defined (short) period of time. Like stop price logic, it places the markets in a "reserve state" where orders may be entered, modified or cancelled but not executed.

- **Circuit breakers.** In our equity index and energy products, circuit breakers halt trading for a period of time when a specified level is reached. In addition, daily price limits prevent trading at prices higher or lower than limits preset by CME.

- **Protection points.** Protection points act as controls against excessive price swings in illiquid markets. These points prevent market and stop orders from being filled at significantly aberrant prices because of the absence of sufficient liquidity.

Another service that CME Group provides to the marketplace is colocation. The criticism of colocation in some of the public coverage of this issue has failed to recognize that colocation actually equalizes access to the benefits of speed through proximity. it used to be that the benefit of speed from proximity was available only to traders who could buy real estate near an exchange, or where he or she thought the server would be.

Because of colocation facilities, such as ours, every trader now has access to colocation. This includes everyone from small retail participants to the largest of Wall Street banks. Everyone in our facility connects with the same length wire, so there are no unequal location advantages. This is one of the true benefits of our colocation services.

Finally, something that this Committee is deeply aware of – but has been largely ignored by the public – is that futures markets are very different from equities markets. Many of the recent complaints against high frequency trading in equity markets simply do not apply to the U.S. futures markets. We think the futures markets strike the right balance of regulating the market without inhibiting true price discovery. This balance of regulation and market surveillance – along with deep pools of liquidity – gives market participants the confidence they have come to expect as they rely on our markets to effectively manage their risk.

Thank you for your consideration of this important issue. We stand ready to be a resource to the Committee on these and other critical issues to the futures and derivatives marketplace.

Testimony of Andrei Kirilenko
Professor of the Practice of Finance
Sloan School of Management
Massachusetts Institute of Technology
Before the Senate Committee on Agriculture, Nutrition & Forestry
Hearing on High Frequency and Automated Trading in Futures Markets
Tuesday, May 13, 2014

Chairwoman Stabenow, Ranking Member Cochran, I am honored to appear before you today at the hearing on high frequency and automated trading in futures markets.

Not so long ago, futures were traded by human traders in face-to-face markets. While to an outsider a pit at a futures exchange looked like a chaotic crowd of agitated people, a trained eye would see structure behind the frenzy. Some of the people stood at certain posts and "made markets." Others were floor brokers who formed circles around the market makers to get the best prices for a broad range of their customers - from farmers hedging their crops to hedge funds taking a view on where the stock market might be going. Yet others were scalpers or spreaders or opportunistic position takers, who wandered around the trading floor looking for opportunities to exploit.

The ecosystem of an open outcry market was well-known, visible to the human eye, and rigidly prescribed and regulated: traders had designated functions, used common gestures to trade, wore jackets of certain colors, and could be found in specific locations on the trading floor.

Today, trading floors have been replaced by server farms, prescribed gestures have been replaced by message protocols, and automated trading is not visible to the human eye. The traders themselves have been replaced by anonymous algorithms that often operate with little or no human oversight.

These days in order to understand what's going on in automated markets, one needs to be fluent not only in regulation and finance, but also in technology and data processing.

In 2008, I joined the Commodity Futures Trading Commission with the goal of developing analytical tools for surveillance and enforcement in automated markets. For a number of years prior to that, I had a vague notion that as markets became automated, financial theories of market structure developed three decades ago ceased to be valid. I just did not know how far things had gone. The events of May 6, 2010 brought it all to a head.

The Flash Crash[1]

On May 6, 2010, in the course of about 36 minutes starting at 2:32pm ET, U.S. financial markets experienced one of the most turbulent periods in their history. Broad stock market indices – the S&P 500, the Nasdaq 100, and the Russell 2000 – collapsed and rebounded with extraordinary velocity. The Dow Jones Industrial Average (DJIA) experienced the biggest intraday point decline in its entire history. Stock index futures, options, and exchange-traded funds, as well as individual stocks experienced extraordinary price volatility often accompanied by spikes in trading volume. Because these dramatic events happened so quickly, the events of May 6, 2010 have become known as the "Flash Crash."

In the aftermath of the Flash Crash, the media became fascinated with the blend of high-powered technology and hyperactive market activity known as high frequency trading (HFT). To many investors and market commentators, high frequency trading has become the root cause of the unfairness and fragility of automated markets. In response to public pressure, government regulators and self-regulatory organizations around the world have come up with a variety of measures to address HFT. Most of these measures proposed in one way or another to "slow things down" or to remove the "speed advantage" of HFT.

Within hours after the Flash Crash, my colleagues and I began conducting an empirical analysis of trading in the E-mini S&P 500 stock index futures market several days before and during May 6, 2010. Based on the analysis of regulatory transaction-level data, we discovered that HFTs did not cause the Flash Crash, but contributed to extraordinary market volatility experienced on May 6, 2010.

We also discovered how high frequency trading can contribute to flash-crash-type events by exploiting short-lived imbalances in market conditions. We argued that in the ordinary course of business, high frequency traders (HFTs) employ strategies that use their technological advantage to aggressively remove the last few contracts at the best bid or offer and then establish new best bids and offers at adjacent price levels.

This type of trading activity, which we call "immediacy absorption", imposes a cost on slower traders, including traditional market makers. Even the small cost of maintaining continuous market presence makes traditional market makers adjust their inventory holdings to levels that can be too low to offset temporary liquidity imbalances. As a result, because the inventory levels of traditional market makers are low, a large enough sell order can lead to a liquidity-based crash accompanied by high trading volume and large price volatility in times of market stress.

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[1] This section is based on a study (joint with Albert S. Kyle, Mehrdad Samadi and Tugkan Tuzun) entitled "The Flash Crash: The Impact of High Frequency Trading on an Electronic Market." The study is here: http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1686004. On February 21, 2014, the CFTC authorized the study for public distribution after a lengthy review process. A draft of the study was previously authorized for public distribution prior to the release of the joint report of the staffs of the CFTC and Securities and Exchange Commission (SEC) entitled "Findings Regarding the Market Events of May 6,

On September 30, 2010, the staffs of the CFTC and Securities and Exchange Commission (SEC) issued a report on the events of May 6, 2010. The 104-page report described how an automated execution program to sell 75,000 contracts of the E-Mini S&P 500 futures, algorithmic trading activity, and obscure order submission practices all conspired to create the Flash Crash.

Flash-crash-type events shake the confidence of market participants and raise questions about the optimal market structure of automated futures markets. With that in mind, my colleagues and I decided to undertake a study of the ecosystem of market participants in automated futures markets over a period of two years. What we found is rather hard to explain.

Concentration of the HFT Industry[2]

According to many anecdotes circulating in the media, high frequency traders seem to possess an uncanny ability to profit in all circumstances. Is that actually empirically true? If yes, why aren't competitive market forces driving those profits to zero through competition? Can anyone actually compete with HFTs?

My colleagues and I set out to answer these questions empirically by looking at two years of regulatory, transaction-level data in the E-mini S&P 500 stock index futures market.

We found, among other things:

- HFTs who specialize in liquidity-taking (aggressive) strategies generate substantially more trading profits than those who specialize in liquidity-providing (passive) strategies.
- Trading profits persistently and disproportionally accumulate to a handful of HFTs. This evidence is consistent with a winner-takes-all industry structure. In a winner-takes-all environment, the trader who is first able to identify and respond to a profitable opportunity will capture all the gains. Traders who are just nanoseconds late simply miss out.
- The concentration of revenue among top-performing HFTs did not decrease over our two-year sample, after adjusting for volatility and non-HFT trading volume.
- New entrants, who are trying to break into the HFT space, earn substantially fewer profits and are more likely to exit.

Taken together, over the two-year period we studied, the HFT industry remained dominated by a small number of fast, opaque (most of the HFTs we identified were not

[2] This section is based on a study (joint with Matthew Baron and Jonathan Brogaard) entitled "The Risk and Return in High Frequency Trading." The study is here: http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2433118. On February 19, 2014, the U.S. Commodity Futures Trading Commission (CFTC) authorized the study for public distribution after a lengthy review process. The study was previously authorized for public distribution by the CFTC's Office of General Counsel on September 27, 2012 and has previously circulated under the title "The Trading Profits of High Frequency Traders."

registered with the federal regulators), and aggressive incumbents who earn high and persistent returns.

Economists generally think that competition from new entrants will improve markets: there will be more liquidity, greater price efficiency, lower transaction costs for investors, and less potential for any one firm to influence markets. The idea behind automated markets was to use technology to reduce execution costs to fundamental traders – farmers, manufacturers and asset managers. However, the competitive environment in which HFTs interact may actually prevent improvements in market quality from being fully realized. With limited competition from new entrants to engage incumbent HFTs, we may not be seeing the gains in market quality that we would otherwise see. A concentrated environment can also lead to socially inefficient investment in faster technology, as small increases in trading speed lead to large payouts, driving an arms race for seemingly small reductions in latency.

This prompted us to look into latency a lot more carefully.

Latency

Latency is the delay between when something happens and when it is recorded. Latency is not unique to automated trading. It is observed in Physics, Systems Engineering, and Computer Science.

In automated financial markets, there are three main types of latency that affect the trading process: communication latency, market feed latency, and trading system latency. Reducing each of these latencies is the first order of business for a trader who wants to trade faster. It is also critical for a trader to be able to predict how much latency its trades and orders will experience in practice.

Communication latency is the time it takes for a message – a standardized packet of data that traders use to communicate with exchanges – to travel between a trader's computer and an automated exchange. In order to reduce communication latency, traders can, for a fee, locate their trading servers as close as possible to the "matching engine" of a trading venue and use the fastest data processing technology inside their co-located cage.

Market feed latency is the time it takes for an automated trading venue to disseminate market data – bids and offers, as well as executed transactions – to all market participants. Market feed latency can be reduced by subscribing, for a fee, to data services provided by exchanges. A "free" market feed data is typically too slow to be used for trading on a regular business; it is just fast enough to meet the regulatory requirements, if any.

Trading system latency is the time it takes for a message to travel inside an automated exchange. Trading system latency can be reduced by investing in technology that moves packets of data inside the exchange faster. There is usually nothing a trader can do about

this type of latency. It is a risk factor. Yet, high frequency traders can still fare better than everyone else other than the exchange itself.

Based on preliminary results from estimating latency inside an automated futures exchange, my colleagues and I are able to show that system latency actually is significantly more volatile than many believe. System latency varies a lot and is not described by a bell-shaped distribution. This means that when an exchange announces that its average system latency is 3 milliseconds, it is not very meaningful. In practice, it can take an exchange 100 microseconds to process a trader's message or 25 milliseconds. System latency is just that random.

We hypothesize that this randomness could be the very reason why the HFT industry can remain immune from competitive market pressures for so long. Incumbent HFTs already transact a huge fraction of the trading volume – by some estimates 50 percent of the total. This gives them significantly more data to estimate latency than anybody else in the market. Over time, this advantage could become the very factor that keeps possible entrants at bay because the challengers would have to sustain losses on their trades long enough to get the latency estimates right. With a limited amount of proprietary capital to deploy, this could well become prohibitive to most entrants.

Regulators and policy makers intuitively noticed that HFTs ability to exploit latency and proposed many measures to "slow things down" or to remove the "speed advantage." Most of these proposals effectively add latency to the trading process as a whole, to the specific actions of market participants, or to the trading activity of a certain group of market participants. For example, a measure called "minimum quote life" proposes to add latency to the time a resting order must be available for trading before it could be cancelled. Another measure proposes to scramble the time priority of market participants by adding random latencies to their original order submission times. Yet another measure proposes to give latency priority to certain market participants ahead of others.

While some of these measures have an intuitive appeal, market participants and the public needs to be aware that they are about adjusting latency in various ways. Then, the public would be better engaged in a debate on how to properly calibrate, test, and evaluate the effectiveness of these measures. Otherwise, a well-intentioned measure can be misunderstood, or worse, give those whose influence it wishes to erode yet another advantage over others.

Recommendations

High frequency and automated trading lies in the intersection of regulation, finance, technology, and data processing. I recommend improvements along each of these lines.

Regulation

Regulation needs to reflect the shift of trading activity towards opaque hyperactive algorithms. In this regard, I recommend creating a broad definition of "automated brokers

and traders" that would be similar to what used be called "floor brokers and traders." The definition needs to be broad enough to cover the activity of all active proprietary traders. For example, if a trader is co-located directly or through a technology vendor (i.e., has the ability to be "present on the automated floor") and uses more than a certain (small) number of messages to communicate with the exchange (i.e., it is "active"), it should register as an automated broker and trader. In my opinion, the registration process does not need to set capital requirements or offer trading privileges. It should, however, require the new registered entities to keep books and records, as well as to implement consistent policies, procedures and safeguards. It is time to go at least this far, so when the next flash crash or technological malfunction happens, the regulators could go deeper into the market ecosystem to piece things together.

Finance

Concentrated industry structure leads to inefficient behavior including arms races and rent seeking. I recommend that regulators closely examine why market forces are not eroding the high concentration of the HFT industry. At the end, the reasons for such high concentration might be benign, but the regulators should not just believe it to be so. They should get a solid understanding of why competition may not be working among the black boxes and take the steps to encourage it.

Technology

Knowledge about system latency can be behind the uneven playing field. To this end, automated exchanges should report system latency indicators to all market participants. Latency for messages for submitted, cancelled, modified, and executed orders should be reported on a periodic basis. This would greatly improve the transparency of the trading process in automated exchanges and level the playing field between those market participants that can estimate how long a bid or offer is likely to be available for trading and those that cannot.

Data processing

Automated trading venues are large systems that generate enormous amounts of data. Algorithms of all sorts – from a slow-moving automated execution program to a market maker to an opportunistic arbitrageur – run on data. Unlike humans who process information at roughly similar speeds, some algorithms are much slower than others. Slower moving "fundamental" algorithms might be optimizing their trading strategies over days, arbitrageurs over hours and minutes, market makers over seconds and high frequency traders over microseconds. On a typical day, differences in speed among different traders contribute to the strength and liquidity of the market. But at a time of market stress, algorithms might need to be aligned with each other, so the entire ecosystem of automated traders functions as a whole.

To this end, I recommend that automated futures exchanges broaden the use of short trading pauses and re-opening auctions. This type of functionality seems to have helped

arrest and reverse the flash crash in the E-mini futures market. It was, however, tailored to kick in only after a giant "gap" has developed in the central limit order book. We don't need to wait for the gaps to become very big or even for the gaps to appear at all. Markets could kick into short trading pauses followed by re-opening auctions for a variety of reasons: too many messages, too long of a time to process, prices moving too fast. This functionality is not without a cost, but the benefits to public confidence – especially for the slower public – might be substantial.

Conclusion

For the public to remain confident that there are no stealthy predators lurking inside our automated futures markets, regulators need to demonstrate that they have drastically upgraded their skills. In the past, the public believed that a regulator is able to spot trouble by monitoring the movements of a designated human trader. Now, the public needs to know that a regulator has the tools and personnel to look for persistent patterns in the data.

The age when a regulator could rely on an overheard conversation to begin an investigation is over. Algorithms don't brag on the phone that they just "hammered the market" or send text messages to their girlfriends about how "fabulous" they are. To catch a manipulative or disruptive behavior of an algorithm, regulators need to have the technological tools to sift through communication and trading patterns among the new inhabitants of the market place – the machines.

This would require not only a substantial investment in new technology, but an equally, if not more, substantial investment in human talent. Since effective regulation of automated markets requires expertise in technology, finance, and data processing, regulators need to develop capacity along all of these lines. Regulators should also ask academia for intellectual guidance and help with building capacity. One of the main reasons I went to MIT after leaving the CFTC is to build this capacity for the regulators and the public. Efficient markets are a public good. We all have a stake in making them better, free of manipulation, abuse, and rent-seeking behavior.

Thank you very much the opportunity to testify before you.

Written Statement of Vincent McGonagle
Director of the Division of Market Oversight, Commodity Futures Trading Commission
Before the Senate Committee on Agriculture, Nutrition and Forestry
May 13, 2014

I. Introduction

Chairwoman Stabenow, Ranking Member Cochran and Members of the Committee, thank you for the opportunity to appear before you today. My name is Vincent McGonagle and I am the Director of the Division of Market Oversight at the Commodity Futures Trading Commission (CFTC or Commission). I am pleased to appear before the Committee to provide an overview of the CFTC's Concept Release on Risk Controls and System Safeguards for Automated Trading Environments (Concept Release). The Concept Release reflects the Commission's ongoing commitment to the safety and soundness of U.S. derivatives markets in times of technological change, including automated and high-frequency trading (HFT).

My written testimony today will describe the Concept Release and provide an overview of public comments received in response to the risk controls and market enhancements discussed therein. It will also describe the regulatory context in which automated and high-frequency trading currently operate, and numerous measures already taken by the Commission to safeguard trading in modern, technology-driven markets.

II. Background on Commodity Exchange Act and the CFTC's Mission

The purpose of the Commodity Exchange Act (Act) is to serve the public interest by providing a means for managing and assuming price risks, discovering prices, or disseminating pricing information. Consistent with its mission statement and statutory charge, the CFTC is tasked with protecting market participants and the public from fraud, manipulation, abusive

practices and systemic risk related to derivatives – both futures and swaps – and to foster transparent, open, competitive and financially sound markets. In carrying out its mission and statutory charge, and to promote market integrity, the CFTC polices derivatives markets for various abuses and works to ensure the protection of customer funds.

To fulfill these roles, the Commission oversees designated contract markets (DCMs), swap execution facilities (SEFs), derivatives clearing organizations, swap data repositories, swap dealers (SDs), futures commission merchants (FCMs) and other intermediaries. The Act generally requires that all futures transactions be conducted on or subject to the rules of a board of trade that the CFTC designates as a DCM. Sections 5 and 6 of the Act and Part 38 of the Commission's regulations provide the legal framework for the Commission to designate DCMs, along with each DCM's self-regulatory compliance requirements with respect to the trading of commodity futures contracts. With the passage of the Dodd-Frank Wall Street Reform and Consumer Protection Act (Dodd-Frank), DCMs were also permitted to list swap contracts. Dodd-Frank also adopted a new regulatory category for exchanges that provide exclusively for the trading of swaps (*i.e.*, SEFs).

III. Exchanges' Self-Regulatory Responsibilities and CFTC Oversight

DCMs and SEFs play an important role in the regulatory structure established for derivatives markets by the Act. As self-regulatory organizations (SROs) they are responsible for front-line oversight of all exchange-traded derivatives subject to the Commission's jurisdiction. DCMs must comply with 23 core principles, including core principles requiring them to establish, monitor and enforce compliance with their rules and to have the capacity to detect, investigate and sanction violative conduct[1] and to prevent manipulation and price distortion.[2]

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[1] *See* 17 CFR 38.150 (Core Principle 2—Compliance with Rules).

SEFs are subject to 15 core principles and must comply with similar requirements to establish and enforce trading and participation rules that will deter abuses, and have the capacity to detect and investigate rule violations.[3] SEFs are also required to monitor trading in swaps to prevent manipulation and price distortion.[4] Commission regulations require DCMs and SEFs to prohibit abusive trading practices by exchange members and market participants, including abuses against customers. Prohibited practices include, but are not limited to, trading ahead of customer orders, accommodation trading, improper cross trading, front-running, wash-trading, pre-arranged trades unless otherwise permitted, fraudulent trading and money passes. DCMs and SEFs must prohibit any other manipulative or disruptive trading practice prohibited by the Act or Commission regulations, and any trading practice that the DCM or SEF believes to be abusive.[5]

To fulfill these responsibilities, DCMs and SEFs are required to and do maintain in-house compliance departments with appropriate human and technology resources, or to contract with third-party regulatory service providers recognized under the Act. DCMs and SEFs must also maintain complete audit trails. For example, DCMs have extensive electronic records of activity on their electronic trade matching platforms. A subset of such records—trade and related order data—is provided to the CFTC daily by DCMs for the Commission's own surveillance activities.[6]

The Division of Market Oversight conducts rule enforcement reviews of DCMs' self-regulatory programs and evaluates their compliance with the Act and Commission regulations.

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[2] *See* 17 CFR 38.250 (Core Principle 4—Prevention of Market Disruption).

[3] *See* 17 CFR 37.200 (Core Principle 2—Compliance with Rules).

[4] *See* 17 CFR 37.400 (Core Principle 4—Monitoring of Trading and Trade Processing).

[5] *See* 17 CFR 38.152 and 17 CFR 37.203(a).

[6] DCMs provide information to the Commission on a "T + 1" basis, *i.e.*, on trade date plus 1.

Such reviews aim to promote DCMs' effective performance as SROs by examining core principles most closely-related to their self-regulatory programs. These include core principles governing DCMs' trade practice surveillance, market surveillance, audit trail, and disciplinary programs. The Division will conduct similar reviews of SEFs in the future. In addition, the Division also conducts direct surveillance of its regulated markets, and continues to improve the regulatory data available for this purpose. For example, in November 2013 the Commission published final rules to improve its identification of participants in futures and swaps markets (OCR Final Rules).[7] While enhancing the Commission's already robust position-based reporting regime, the OCR Final Rules also create new volume-based reporting requirements that significantly expand the Commission's view into its regulated markets, including with respect to high-frequency traders.

IV. Expansion of CFTC Enforcement Authority under Dodd-Frank and New Regulations Relevant to Automated Markets

The Commission's responsibilities under the Act include mandates to prevent and deter fraud, manipulation, and disruptive trading. Dodd-Frank broadened the Commission's enforcement authority to include swaps markets. Under the new law and rules implementing it, the Commission's anti-manipulation reach is extended to prohibit the reckless use of manipulative schemes. Specifically, Section 6(c)(3) of the Act now makes it unlawful for any person, directly or indirectly, to manipulate or attempt to manipulate the price of any swap, or of any commodity in interstate commerce, or for future delivery on or subject to the rules of any registered entity. In addition, new Section 4c(a) of the Act now explicitly prohibits disruptive trading practices, such as the violation of bids or offers, intentional or reckless disregard for the

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[7] Commission, Final Rule: Ownership and Control Reports, Forms 102/102S, 40/40S, and 71, 77 FR 69177 (Nov. 18, 2013).

orderly execution of transactions during the closing period, or the placement of bids or offers with the intent to cancel such bids or offers before execution (commonly known as "spoofing").[8]

A number of Commission rulemakings to implement Dodd-Frank have focused specifically on safeguards for automated trading. These new rules address both market participants, such as FCMs, SDs and others, and exchanges, including both DCMs and SEFs. In April 2012, the Commission adopted Regulations 1.73 and 23.609 requiring FCMs, SDs and major swap participants ("MSPs") that are clearing members to establish risk-based limits based on "position size, order size, margin requirements, or similar factors" for all proprietary accounts and customer accounts.[9] The rules also require FCMs, SDs and MSPs to "use automated means to screen orders for compliance with the [risk] limits" when such orders are subject to automated execution.[10] The Commission also adopted rules in April 2012 requiring SDs and MSPs to ensure that their "use of trading programs is subject to policies and procedures governing the use, supervision, maintenance, testing, and inspection of the program."[11]

In June 2012, the Commission adopted rules to implement the 23 core principles for DCMs.[12] Regulation 38.255 requires DCMs to "establish and maintain risk control mechanisms to prevent and reduce the potential risk of price distortions and market disruptions, including, but not limited to, market restrictions that pause or halt trading in market conditions prescribed by

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[8] The Commission further clarified the scope of these prohibited disruptive trading practices in its Interpretive Guidance and Policy Statement on Disruptive Practices. 78 FR 31890 (May 28, 2013).

[9] 17 CFR 1.73(a)(1) and 23.609(a)(1).

[10] 17 CFR 1.73(a)(2)(i) and 17 CFR 23.609(a)(2)(i).

[11] 17 CFR 23.600(d)(9).

[12] Commission, Final Rule: Core Principles and Other Requirements for Designated Contract Markets, 77 FR 36612 (Jun. 19, 2012) (the "DCM Final Rules").

the designated contract market."[13] Regulation 37.405 imposes similar requirements on SEFs.[14] In addition, the Acceptable Practices for DCM Core Principle 4 (Prevention of Market Disruption) and Guidance to SEF Core Principle 4 (Monitoring of Trading and Trade Processing) identify pre-trade limits on order size, price collars or bands, message throttles and daily price limits as responsive measures that a DCM or SEF may implement to demonstrate compliance with elements of Core Principle 4.[15]

The DCM rules also set forth risk control requirements for exchanges that provide direct market access ("DMA") to clients. Regulation 38.607 requires DCMs that permit DMA to have effective systems and controls reasonably designed to facilitate an FCM's management of financial risk. These systems and controls include automated pre-trade controls through which member FCMs can implement financial risk limits.[16] Regulation 38.607 also requires DCMs to implement and enforce rules requiring member FCMs to use these systems and controls.[17] Finally, the DCM rules implement new requirements in the Act related to exchanges' cyber security and system safeguard programs. As with its rule enforcement reviews, the Division also conducts periodic systems safeguards examinations to review DCMs' compliance with the systems safeguards and cyber security requirements of the Act and Commission regulations. The Act and Commission regulations also address cyber security and system safeguards within SEFs.

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[13] 17 CFR 38.255.

[14] 17 CFR 37.405.

[15] DCM Final Rules, 77 FR at 36718; Commission, Final Rule: Core Principles and Other Requirements for Swap Execution Facilities, 78 FR 33476, 33601 (June 4, 2013).

[16] 17 CFR 38.607.

[17] *Id.*

V. The CFTC's Concept Release on Risk Controls and System Safeguards for Automated Trading Environments

The Commission's Concept Release on Risk Controls and System Safeguards for Automated Trading Environments was published in the Federal Register on September 12, 2013.[18] The initial 90-day comment period closed on December 11, 2013, but was reopened from January 21 through February 14, 2014, in conjunction with a meeting of the CFTC's Technology Advisory Committee (TAC). As discussed in further detail below, the Concept Release considers a series of potential pre-trade risk controls; post-trade reports; the design, testing, and supervision standards for automated trading systems (ATS) which generate orders for entry into automated markets; market structure initiatives; and other measures designed to reduce risk or improve the functioning of automated markets. The Concept Release also requests public comment on 124 separate questions regarding the necessity and operation of such measures in today's markets. In this regard, the Concept Release serves as a vehicle to catalogue existing industry practices, determining their efficacy and implementation to date, and evaluating the need for additional measures. The Concept Release is not a proposed rule, but rather a prior step designed to engage a public dialogue and educate the Commission so that it may make an informed determination as to whether rulemaking is necessary and, if so, the substantive requirements of such a rulemaking.

The Commission received a total of 43 public comments on the Concept Release, including comments from DCMs; an array of trading firms; trade associations; public interest groups; members of academia; a U.S. federal reserve bank; and consulting, technology and information service providers in the financial industry. All comments are available on cftc.gov.

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[18] Commission, Concept Release on Risk Controls and System Safeguards for Automated Trading Environments, 78 FR 56542 (Sept. 12, 2013).

Many of the comments received are detailed and thorough, including some comment letters that addressed all 124 questions presented in the Concept Release. One commenter conducted a survey of its member firms to gauge existing risk-management practices. Other commenters provided academic papers in support of their points of view, and some focused on elements of the Concept Release that are of particular interest to them. CFTC Staff is studying all comments received and will make initial recommendations once its review is complete.

Fundamentally, the Concept Release asks whether existing risk controls in automated trading environments are sufficient to match the technologies and risks of modern markets. In this regard, the Concept Release focuses on the totality of the automated trading environment, including the progression of orders from the ATSs that generate them, through the clearing firms that guarantee customer orders, and on to execution by registered trading platforms. The Concept Release also addresses ATSs themselves, including their design, testing and supervision. It also raises a number of related issues, ranging from the underlying data streams used by ATSs to inform their trading decisions, to the special considerations involved in trading via direct market access. It also asks whether terms such as "high-frequency trading" should be defined in regulations, and whether HFT firms should be registered with the Commission.

The Concept Release was informed by a number of factors, including: (1) controls or best practices already in use or developed within industry; (2) existing CFTC regulatory standards that address automated trading; and (3) best practices developed by expert groups and outside organizations, including international standard setting bodies, foreign jurisdictions, and the CFTC's TAC.

The Concept Release begins with an overview of the automated trading environment, including the development of automated order-generating and trade-matching systems; advances in high-speed communication networks; the growth of interconnected automated markets; and the changed role of humans in markets. It also highlights the importance of ATSs as tools for the generation and routing of orders.

These developments are addressed in the Concept Release through a series of 23 potential risk controls and other measures broadly grouped into four categories. The first includes "pre-trade risk controls," such as controls designed to prevent potential errors or disruptions from reaching trading platforms, or to minimize their impact once they have. Specific pre-trade risk controls include maximum message rates, execution throttles, and maximum order sizes. Depending on the measure, pre-trade risk controls could be applicable to all trading firms; to trading firms operating ATSs; to clearing firms; or to trading platforms. The Concept Release includes a total of eight pre-trade risk controls and sub-controls.

A second category of safeguards includes "post-trade reports" and "other post-trade measures." Examples in this category include reports that promote the flow of order, trade and position information; uniform trade adjustment or cancellation policies; and standardized error trade reporting obligations. These measures could be applicable to all trading firms; to trading platforms; or to clearing houses. There are a total of five post-trade reports and other measures or sub-measures in this category, including post-order, post-trade, and post-clearing drop copies.

The third category of risk controls discussed in the Concept Release is termed "system safeguards," including safeguards for the design, testing and supervision of ATSs, as well as measures such as "kill switches" that facilitate emergency intervention in the case of

malfunctioning ATSs. Such safeguards would generally be applicable to trading firms operating ATSs, and depending on the control, might also apply to trading platforms and others. The Concept Release presents a total of seven system safeguards, some with subparts.

Finally, the Concept Release presents a fourth category of measures focusing on various options for potentially improving market functioning or structure. These includes measures such as mandatory publication by exchanges of various market quality indicators to help inform market participants (*e.g.*, order to fill ratios; execution speeds for different types of orders and order sizes; price impacts associated with different trade sizes; and average order duration). They also include a number potential measures requiring exchanges to amend their trade matching systems by, for example: (1) providing batch auctions instead of continuous trade matching; (2) prioritizing orders resting in the order book for some minimum period of time; or (3) aggregating multiple small orders from the same legal entity entered contemporaneously at the same price level and assigning them the lowest priority time-stamp of all orders so aggregated.

As a threshold matter, the Concept Release recognizes that orders and trades in automated environments pass through multiple stages in their lifecycle, from order generation, to execution, to clearing, and steps in between. Accordingly, it solicited comment regarding the appropriate stage or stages at which risk controls should be placed. Focal points for the implementation of risk controls described in the Concept Release include: (i) ATSs prior to order submission; (ii) clearing firms; (iii) trading platforms prior to exposing orders to the market; (iv) clearing houses; and (v) other risk control options, such as third-party "hubs" through which orders or order information could flow to uniformly mitigate risks across various platforms. The Concept Release recognizes that the appropriate location of a risk control also

may depend on the type of control or its intended purpose. Therefore, it specifically seeks comment on this question, and on the desirability of a "layered" or "defense in depth" approach that places the same or similar risk controls at more than one stage of the order and trade lifecycle.

Given the variety and complexity of matters raised in the Concept Release, commenters understandably held a range of opinions. Many commenters expressed satisfaction that the Commission has undertaken this review of risk controls and system safeguards in automated trading environments. Based on comments received and other indications, a number of parties support certain Commission actions. Some have expressed "race to the bottom" concerns in the absence of minimum regulatory standards. In this regard, any risk controls that introduce latency (*i.e.*, reduce speed) in the generation or transmission of orders could create competitive disadvantage for firms that adopt them unilaterally.

Most commenters also supported a multi-layered approach to risk controls. One commenter stated, for example, that a "holistic approach, with overlapping supervisory obligations, offers the most robust protection by engaging all levels of the supply chain…and eliminating the possibility that a single point of failure will cause significant harm to the market." Another entity commented with respect to ATS testing and change management that "the same levels of responsibility for testing and change management should apply to all market participants that deploy their own technology, as well as providers of technology that allows access to the markets."

At the same time, other measures contemplated in the Concept Release drew opposition by a majority of commenters. For example, a majority of parties who commented on the idea of

a credit risk control implemented through a centralized hub were opposed to the idea, citing costs, complexity and an undesirable concentration of risk.

Certain key questions in the Concept Release drew very divergent opinions. Commenters disagreed on the need for a regulatory definition of high-frequency trading. Just over half of the parties who commented on this point were opposed to a definition, while the remainder were in favor. The question of defining high-frequency trading is closely related to the question of whether HFT firms not already registered with the Commission in some capacity should be required to register. Those opposed to defining high-frequency trading suggested that no clear distinction can be drawn between automated trading and high-frequency automated trading, or pointed to the difficulty in defining HFT and to the concern that any definition of HFT would become obsolete over time.

A commenter's opinion as to whether HFT should be defined typically ran in parallel with its opinion as to whether risk controls should apply equally to all automated systems, or whether high-frequency trading or HFT firms deserve special regulatory attention. Those requesting HFT-specific measures logically saw a need to define high-frequency trading. More fundamentally, however, some academic commenters discussed concerns around the speed of trading, including within exchange order books, and suggested steps to slow trading or to reduce any potential advantages that come with speed.

One recurring theme across comments is whether pre-trade risk controls and other measures should focus on high-level principles or be more granular instead. Many industry commenters stated their preference for a principles-based approach to any rules that the Commission may adopt. These commenters argued that prescriptive requirements will become

obsolete as technologies advance; may not account for the unique characteristics of market participants; and could result in participants designing around such measures. Similarly, one commenter noted that the best way to achieve standardization of risk controls is through implementing "best practices" developed through working groups of DCMs, FCMs, and other market participants.

Other commenters, however, expressed a need for more prescriptive rules. One argued, for example, that prescriptive rules are necessary unless the Commission receives documentation that the risk controls implemented by firms and exchanges are consistent and effective. Another commenter questioned whether the incentives facing industry participants would permit them to, quote, "sacrifice speed for prudent risk controls."

Finally, as with the high-level questions discussed above, many of the specific pre-trade risk controls and other safeguards discussed in the Concept Release drew divergent opinions, either around whether the control should be a regulatory requirement or, if a requirement, how granular it should be. Commenters also addressed the appropriate design and use of particular risk controls. For example, one commenter stated that "kill switches, if implemented and used properly, can serve as an effective last-resort means of risk control," but "are not a panacea and should only be used during extreme events when all other courses of action have been exhausted." Another commenter specified that kill switches should exist at the trading firm, clearing firm and trading platform level, and that the Commission should assess the methodology used to set kill switch limits.

As noted previously, staff continues to review all comments received and to refine its thoughts. Next steps could include potential recommendations to the Commission for notice and comment rulemaking in one or more areas addressed by the Concept Release.

This concludes my written testimony.

DOCUMENTS SUBMITTED FOR THE RECORD

MAY 13, 2014

APPENDIX A

CME Globex Risk and Volatility Mitigation Tools

The CME Globex electronic trading platform incorporates numerous automated risk management and volatility mitigation mechanisms to protect market integrity and market participants.

Price Banding

- To help ensure fair and orderly markets, CME Globex subjects all order to price verification upon entry using a process called price banding. Price banding is designed to prevent the entry of orders at clearly erroneous prices, such as a bid at a limit price substantially above the market, thereby mitigating the potential for a market disruption.
- Futures price Banding: For each product, CME Group establishes a Price Band Variation parameter which is a static value that is symmetrically applied to the upside for bids and downside for offers relative to a reference price. The reference price, referred to as the Banding Start Price, is a dynamically calculated value based on market information such as last trade price, best bid and offer price or the indicative opening price. Orders entered at prices beyond the Price Band Variation parameter relative to the reference price are rejected by the Globex engine.
- Options Price Banding: Options price banding functionality is similar to futures price banding except that the Banding Start Price may reference theoretical option prices based on established option pricing models in addition to last trade price. Additionally, the width of the price bands may be either a static value for a particular option series of a dynamic value that adjusts based on the option's delta or a delta-adjusted percentage of the option's theoretical price.

Protection Points for Market & Stop Orders

- CME Group employs proprietary functionality that applies a limit price (protection point) to each market order entered on the CME Globex platform and to each stop order entered without a limit price. This functionality prevents orders from being filled at significantly aberrant price levels because of the absence of sufficient liquidity to satisfy the order at the time the market order is entered or the stop order is triggered.
- The protection points for each product are generally defined as one half of the product's "non-Reviewable Range," a value that is established in connection with the exchanges' Trade Cancellation and Price Adjustment rules. The protection point is measured from the best bid price for sell market orders, the best offer price for buy market orders, and the stop trigger price for stop orders. Any quantity on the order that is unfilled at the protection point level becomes a resting limit order at the price.

Maximum Order Size Protection

- Maximum order price protection is embedded Globex functionality that precludes the entry of an order into the trading engine if the order's quantity exceeds a pre-defined maximum quantity. Orders entered for a quantity greater than the prescribed maximum quantity are rejected by the Globex engine. This functionality helps to avoid market disruptions by preventing the entry of erroneous orders for quantities above the designated threshold.

Stop Logic Functionality

- Stop Logic functionality is CME Group proprietary functionality that serves to mitigate artificial and disruptive market spikes which can occur because of the continuous triggering, election, and trading of stop orders in an illiquid market condition. On CME Globex, if elected stop orders would result in execution prices that exceed pre-defined thresholds, the market automatically enters a reserve period for a prescribed number of seconds; the length of the pause ranges from five to 20 seconds and varies based on the characteristics of the product and time of day at which the stop logic even is triggered. During the reserve period, new orders are accepted and an indicative price is published, but trades do not occur until the reserve period expires, thereby providing an opportunity for participants to respond to the demand for liquidity.

Velocity Logic Functionality

- Velocity Logic is a patented, proprietary functionality within the Globex trading engine that is designed to detect significant price moves of Futures contracts occurring within a predetermined period of time. Velocity Logic is capable of detecting market movements originating from any type of order accepted on Globex. If a sub-second, extreme market move occurs as a result of order entry, Velocity Logic will reserve the instrument in question and pause applicable option markets. The market will then automatically enter a reserve period for a prescribed number of seconds; the length of the pause ranges from 5 to 20 seconds and varies based on the characteristics of the product and time of day at which the stop logic event is triggered. During the reserve period, new orders are accepted and an indicative price is published, but trades do not occur. When the reserve period expires, the market will re-open and trading will resume.

Globex Credit Controls

- CME Group requires clearing firms to employ CME Globex Credit Control functionality which provides automated pre-trade risk controls at the trading firm level without introducing additional order processing latency. The specific credit limits for each trading firm are established by the Clearing Firm Risk Administrator.
- Clearing Firm Risk Administrators are able to select automated real-time actions if the established risk limits are hit, including e-mail notification, blocking of non risk-reducing orders and the cancellation of working orders; the Administrator may also set levels at which early warning notifications will be automatically generated.
- CME Globex Credit Controls provide protection against high level risk arising from adverse execution activity and are intended to complement rather than replace the risk management tools used by clearing firms to manage risk at the more granular trader and account level.

Risk Management Interface

- The Risk Management Interface (RMI) is both an API and GUI that supports granular, pre-trade risk management. Clearings firms can leverage Drop Copy to feed real time executions into their proprietary risk systems. The proprietary risk systems can in turn leverage the RMI API to trigger blocking or cancelations based on the clearing firm's independent calculations. Certification is required to support the RMI API, and access to the RMI API is limited to Clearing Firms' certified proprietary and third-party risk management applications.

The RMI API allows Clearing Firms (or third party risk system providers) to programmatically s end instructions to:

- Block/Unblock order entry at the execution firm/account/derivative type (future or option)/side/product levels;
- Query current block/unblock instructions; and
- Cancel working orders, including Good Til Cancel (GTC) and Good Til Date (GTD) order types

The RMI GUI is a web-based user interface that allows Clearing Firms to:

- Block/Unblock order entry at the same levels as the API; and
- View current blocks

Kill Switch

- CME Globex Kill Switch is a GUI designed to allow clearing firms a one-step shutdown of all their CME Globex activity at the SenderComp ID (Tag 49) level. When CME Globex Kill Switch functionality is activated by the permissioned firm, all order entry is blocked and all working orders are cancelled for either a selected subset or the entire firm's SenderComp IDs.
    - All Clearing Firms may access the Kill Switch which appears as a separate tab in the same GUI where Globex Credit Controls reside.
    - Clearing firms may also authorize Globex execution firms to leverage the Kill Switch for their own business. Clearing firms' orders always take precedence over non clearing firms' instructions.
    - Customers subject to a Kill Switch action are prevented from submitting any message that could modify or result in an order.
    - Customers subject to a Kill Switch action trying to submit orders receive a reject message with entity level (clearing or execution firm) and administrator role information.

Market Performance Protection

- Sustained excessive messaging to the trading engine can cause disruptive latencies that impair market efficiency and negatively impact the market access of other participants; such messaging may also be indicative or a potentially malfunctioning automated order entry system. To mitigate these risks and protect the market and market participants, CME Group employs automated controls at the session (connection) level to monitor for excessive messaging.
- Messaging Volume Controls: If a connection exceeds the CME Group established message per second threshold over a rolling three-second window, then subsequent messaging, other than order cancellations, will be rejected by the trading engine until the average message per second rate falls below the threshold.
- Mass Quote Governor: Mass quoting functionality, used exclusively by CME Group approved market makers, allows bids and offers on a large number or options to be entered simultaneously in a single order message, thereby increasing quoting efficiency. The Mass Quote Governor functionality measures the number of quotes per second for each session and will reject new mass quote messages and cancel resting quotes if the number of messages exceeds the allotted quoted per second limit over a defined number of seconds. This functionality

prevents excessive mass quote messaging that could otherwise result in disruptive quote processing inefficiencies for customers.

Market Maker Protections

- Market Maker Protection functionality provides CME Group registered options market makers using Mass Quotes[1] functionality the ability to set various parameters which help to mitigate their quote execution exposure. These protections include limits on the number of quotes executed in their entirety, the number of separate executions, the number of unique instruments traded and the net quantity of instruments traded. When the market maker's defined protection values are met or exceeded within a 15 second interval, the protections are triggered and outstanding quotes are automatically cancelled. Additionally, market makers can set delta protection values to limit exposure. These protection help to reduce the potential for disruptive trades by facilitating greater liquidity and mitigating the possibility of a party taking on excessive exposure.

Self-Match Prevention

- Self-Match Prevention functionality allows market participants the option to prevent, where appropriate, buy and sell orders for the same account, or accounts with common beneficial ownership, from matching opposite one another. Market participants that choose to employ this functionality must populate a new FIX tag (Tag 7928) on all orders sent to CME Globex which allows the match engine to detect buy and sell orders at the same executable price level in a particular contract and cancel the resting orders on one side of the market if both orders have the same executing firm number and Self-Match Prevention ID, thus preventing self-trades.

Cancel on Disconnect Protection

- Cancel on Disconnect functionality is an opt-in service that allows for the automatic cancellation of resting day orders when a user's connection to Globex involuntarily drops.

Drop Copy Risk Management Services

- CME Group's Drop Copy service allows customers to receive, via a FIX messaging interface, real-time copies of Globex execution reports, acknowledgement and reject messages. This enables firms to fee the data to their internal risk systems, allowing firms to monitor risk on a real time basis. The Drop Copy service also allows for monitoring of aggregate activity guaranteed by one or more clearing firms upon approval of the clearing firms.

FirmSoft Order Management Tool

- FirmSoft is a browser-based order management tool which provides real-time access to information on working and filled Globex orders, as well as order modification history. Access to FirmSoft can be granted based on one or more Trader IDs, sessions and/or account numbers.
- FirmSoft also allows users to cancel an individual order, a group of orders, or all working orders and mass quotes. The "Cancel All" or "Kill Button" functionality provides important risk mitigation functionality at all times including during system failures.

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[1] For additional information on Mass Quotes *See* http://www.cmegroup.com/confluence/display/EPICSANDBOX/Mass+Quotes.

Risk Protection Policies, Programs, and Rules

Access and Controls

- All direct connections to CME Globex require the execution of a Customer Connection Agreement that includes, among other provisions, a requirement that the connection be guaranteed by a clearing member firm which agrees to be financially responsible for all orders sent to the Globex platform through the connection.
- Any clearing member firm providing CME Globex access to its customers must comply with all Credit Control requirements set forth in the Customer Connection Agreement which include requirements that there be separation between trading and credit control functions; that the clearing firm be able to set, monitor and adjust credit control parameters such as quantity, position, and exposure limits; that the clearing firm be able to set pre-execution controls th4rough automated means or by requiring an employee to take action to accept orders; and that the clearing firm be able to revoke a trader's access to the market.
- The Customer Connection Agreement requires the entity obtaining the connection to agree to comply with and be subject to the rules of the CME Group exchanges. Additionally, clearing members guaranteeing a connection to Globex are responsible for ensuring that the order routing/front-end audit trail for all electronic orders is maintained for a minimum of five years.

Certification and Testing

- CME Group requires that all entities connecting directly to CME Globex perform application testing and be certified by CME Group with regard to a board array of interface and functionality requirements before accessing the production environment. CME Group provides customers with dedicated testing and certification environments which, in combination with the certification requirements, mitigate the risk of customer systems adversely affecting CME Group markets or the customer's own business.
- The CME Globex Certification environment mirrors production functionality and is used by customers to perform certification testing for core Globex functionality, maintenance testing and development testing for new customer system features or functionality.
- The CME Globex New Release environment is used by customers to preform development and certification testing with respect to the new Globex functionality as well as to test new products prior to their production launch

Risk Management

- All CME Group exchanges have a Risk Management rule (Rule 982) that requires clearing member firms to have written risk management policies and procedures in place to ensure they are able to perform basic risk and operational functions at all times including: monitoring credit risks of customers and proprietary trading activity; limiting the impact of significant market moves through the use of tools such as stress testing or position limits; maintaining the ability to monitor account activity on an intraday basis; and ensuring that order entry systems include the ability to set automated credit controls or position limits or otherwise require a firm employee to enter orders. The CME Clearing Risk Management Department periodically conducts reviews of clearing firm risk management policies, procedures, and capabilities and how well those risk management programs correspond to the firm's lines of business.

Trade Cancellation and Price Adjustment Rules

- All CME Group exchanges have a Trade Cancellation and Price Adjustment rule (Rule 588) that is designed to balance market participants' legitimate expectations of trade certainty with the adverse effects on market integrity of executing trades and publishing trade information that is inconsistent with prevailing market conditions. This rule authorizes the Globex Control Center ("GCC") to adjust trade prices or cancel trades when such action is necessary to mitigate market disrupting events caused by the improper or erroneous use of the electronic trading system r by system defects. In order to enhance trade certainty and mitigate the creation of additional exposures, erroneous trades are price adjusted rather than cancelled whenever possible.
- Rule 588 codified an explicit non-reviewable price range for each futures product and an explicit methodology for determining the non-reviewable price range for each options product. The non-reviewable range is applied above and below the fair-value price determined by the GCC based on relevant market information. Transactions that occur outside of the non-reviewable range may be price-adjusted by the GCC pursuant to a transparent methodology for establishing the adjusted price or cancelled by the GCC. Notwithstanding any other provisions of the rule, the GCC has the authority to adjust trade prices or cancel any trade if it determines that allowing the trade to stand as executed would have a material, adverse effect on the integrity of the market.
- Rule 588 also provides that a party entering an order that results in a price adjustment or trade cancellation is responsible for demonstrated claims of realized losses incurred by persons whose trade prices were adjusted or cancelled, provided that the harmed party took reasonable actions to mitigate any losses.

Price Limits and Circuit Breakers

- Numerous CME Group products have rules that establish daily price limits and/or circuit breakers in order to promote market confidence and mitigate risks to the market infrastructure by allowing market participants time to assimilate information and mobilize liquidity during periods of sharp and potentially destabilizing price swings. Circuit breaks are calibrated at defined levels and completely halt trading for a defined period of time or for the balance of the day's trading session. Price limits allow trading to continue, but only within the defined limits.

CME Globex Messaging Efficiency Program

- The CME Globex Messaging Efficiency Program is designed to encourage responsible messaging practices and discourage excessive messaging that does not contribute to market quality. Under the program, CME Group establishes messaging benchmarks based on a per-product Volume Ratio, which is defined as the ratio of the number of messages submitted to the volume executed in a given product. Generally, the Program will be administered at a CME Group executing firm level, but CME Group may, in its reasonable discretion, decide to apply the Program at a more granular level (i.e. iLink session, account or Tag 50). Further, CME Group may aggregate executing firms for purposes of determining whether a Product Group Benchmark has been exceeded in circumstances where a single entity is submitting messages via more than one executing firm number. Entities that exceed these thresholds and fail to correct their messaging practices pay a surcharge. This policy benefits all market participants by discouraging excessive messaging, which in turn helps to ensure that the trading system maintains the responsiveness and reliability that supports efficient trading.

User Identification and Automated Trading System Identification

- All orders must be submitted to CME Globex with a user identification tag (Tag 50 ID) that represents the party who input the order into the Globex system. The tag must be unique at the clearing firm level. In the case of an ATS, the Tag 50 identifies the person or team or persons who operate, administer, and/or monitor the ATS. If the ATS operator is responsible for multiple algorithms which operate in the same product, then each specific algorithm must be assigned a unique Tag 50 ID. Additionally, if the client receives preferential exchange fees, the name and other identifying information of the operator(s) must be registered with the exchange; in the case of an ATS operator this registration includes an ATS attribute that is attached to orders entered by that operator in the exchange's audit trail systems. Additionally, the Globex Control Center and Market Regulation Department have the authority to require that a customer with significant messaging register with the exchange, irrespective of whether the customer receives preferential fees.
- CME Group further requires that all users populate new tags associated with each order. The tags identify whether the particular order originates from an automated trading system or is manually entered, the geographic origin from which the order was submitted to the trading system, and the identification of the front-end system and version/release of the software used to enter the order.
- The user identification rules substantially aid the prompt evaluation and investigation of potentially problematic activity.

QUESTIONS AND ANSWERS

MAY 13, 2014

Senate Committee on Agriculture, Nutrition & Forestry

High Frequency and Automated Trading in Futures Markets

May 13, 2014

Questions for the Record

Mr. Terrence Duffy

Executive Chairman & President

CME Group, Inc.

Senator Chuck Grassley

1. ***How long after High Frequency Trading began did CME start to offer co-location services to customers?***

CME Group opened our co-location facility located in Aurora, Illinois in January 2012. Our facility offering is available to all market participants and service providers, including individuals, banks, asset managers, proprietary trading firms, hedge funds, independent software vendors (ISVs) and market data distributors. The criticism of colocation in some of the public coverage has failed to recognize that colocation actually equalizes access to the benefits of speed through proximity. It used to be that the benefit of speed from proximity was available only to traders who could buy real estate near an exchange, or where he or she thought the server would be. Because of colocation facilities such as ours, every trader now has access to colocation. This includes everyone from small retail participants to the largest of Wall Street banks. Everyone in our facility connects with the same length fiber, so there are no unequal location advantages.

Here is a link which more fully describes our co-location services:
http://www.cmegroup.com/trading/colocation/co-location-services.html

2. ***According to reports, High Frequency Trading now accounts for about 60% of the trading volume on the CME. Are you concerned that high frequency traders who provide liquidity are monopolizing markets over the people who rely on these markets for risk management?***

There is a broad range of opinion on whether HFT should or can be accurately defined, and if so, whether it can be defined in a way that is neither too narrow nor overly broad. Because the industry has yet to adopt a common definition of HFT, any estimation of exchange-traded volume attributable to HFT is inherently subjective. For example, reports published by third-parties, and the data used to compile those reports, may include other types of automated trading (non-HFT), and therefore may not be reliable. CME Group estimates that HFT could account for closer to one-third of our trading volume across our exchanges.

We do not believe that high frequency trading is monopolizing the markets. Furthermore, high frequency traders, as liquidity providers, often sell to or buy from market participants who rely on our markets to effectively manage their risks. CME Group agrees with the many academics who have taken the position that HFT benefits the markets as it brings more liquidity to markets, facilitates tighter spreads, and helps reduce the cost of trading for all market participants.

3. ***Do you agree with Dr. Kirilenko that a nanosecond can make all the difference for High Frequency Traders?***

We believe that our development of electronic trading has opened the futures markets in a profound way to serve the needs and demands of our diverse and global customer base. As it has advanced, the speed of trade execution has become an important factor in some trading strategies. Both innovation and increased speed of electronic trading has challenged CME Group to ensure that our markets continue to operate with integrity, and are fair and open to all customers. We have been committed to this task for years. Our market structure, based on a central limit order book, a single market data feed, surveillance and audit tools, and risk controls have served us well in meeting this challenge. Electronic trading, including high frequency trading, has increased market efficiency by adding liquidity, tightening bid-ask spreads, and helping to maintain price alignment between markets to the benefit of our customers that rely on deep liquid markets to achieve their risk management and investment objectives.

CME Group remains committed to ensuring integrity and fairness for all of our customers across all of our markets.

Senator John Thune

1. ***Your testimony includes mention of several risk controls that CME already utilizes to ensure market access and integrity. Could you give us a brief summary of those controls? Are these or similar controls utilized by other commodity exchanges in the US and around the world?***

Below is a brief summary of the risk controls I highlighted in my testimony before the Committee. CME Globex incorporates these and other tools to manage risk and volatility and mitigate market disruptions.

(These and other tools are also described in Appendix A attached. Appendix A is part of CME Group's December 11, 2013 comment to the CFTC's *Concept Release on Risk Controls and System Safeguards for Automated Trading Environments* (RIN #3038 – AD52)).

- **Credit controls.** Pre-execution risk controls are provided that enable clearing firms to set credit limits for their executing firms. Our credit controls, which every clearing firm is required to use, can include order blocking, order cancellations and email notifications, which can be set at varying thresholds. We also employ a tool called, "*Cancel on Disconnect*" that will cancel all resting orders for a market participant that gets disconnected from our system.

- **Price banding.** All orders are subject to price verification. Bids at prices well above or offers at prices well below the market fall outside of that contract's "band" and are rejected.

- **Maximum order quantity.** Every product has a pre-defined maximum quantity per order. This step ensures that the order is not exceeding this limit. If the maximum quantity is exceeded, the order is rejected.

- **Messaging controls.** These controls limit the rate at which firms can submit mass quotes and can block orders from entering the system if volume thresholds or order quantities are exceeded.

- **Stop-logic functionality.** Stop logic can automatically halt the market for a predetermined time period in order to help prevent extreme price deviations. When it was triggered on May 6, 2010, stop logic reversed the course of the Flash Crash by halting the market for enough time for liquidity to be replenished.

- **Velocity-logic functionality.** This is designed to guard against rapid price spikes. It is triggered by a pre-specified price movement over a defined (short) period of time. Like stop price logic, it places the markets in a "reserve state" where orders may be entered, modified or cancelled but not executed.

- **Circuit breakers.** In our equity index and energy products, circuit breakers halt trading for a period of time when a specified level is reached. In addition, daily price limits prevent trading at prices higher or lower than limits preset by CME.

- **Protection points.** Protection points act as controls against excessive price swings in illiquid markets. These points prevent market and stop orders from being filled at significantly aberrant prices because of the absence of sufficient liquidity.

CME Group believes that other futures exchanges located in and outside the United States utilize forms of risk controls, but we cannot confirm which controls are in place at those exchanges and to what extent.

In the fall of 2010, CME Group exchanges did participate in an FIA-sponsored survey of global future exchanges regarding their electronic trading risk controls. The FIA 2010

survey is available at: http://www.futuresindustry.org/webinars/fia-survey-of-risk-controls-at-futures-exchanges.asp. We understand that the 2010 survey has not been updated.

2. ***If the CFTC were to propose new risk controls for the futures markets specific to high frequency and automated trading, where in the life cycle of a trade should those controls occur?***

CME Group believes that, at the exchange level, effective risk controls should be implemented equally across all market participants regardless of the type of strategy or trading style a firm deploys through its automated trading system.

Moreover, we believe that each market participant should be obligated to have risk systems necessary and adequate for the type of trading they employ. The risk systems at HFT firms, for example, would have to have sufficient capacity to handle the order flow generated by the firm. While the capacities of the systems may vary, the controls may be identical between an HFT firm and a firm that utilizes non-HFT systems.

CME Group supports the CFTC adopting principles-based rules that are: (1) flexible and can adapt to changing circumstance over time, (2) favor distributive motives, (3) promote accountability on the part of decision makers, and (4) allow decision makers at the firm level to tailor effective supervision and risk management programs that are consistent with the nature of their businesses.

So long as regulations require firms to have risk systems adequate for the type of trading employed by the firm, we do not believe that regulations need to distinguish between HFTs and Non-HFTs.

3. ***Do you believe that registering high frequency traders will help or hinder market access and integrity?***

CME Group does not believe that requiring the registration of firms deploying automated trading systems, including HFTs, would provide any significantly additive regulatory benefit because information about them is already available to regulators.

A registration rule is typically designed to provide a regulator with certain identification information regarding market participants, or a means to require registrants to meet certain standards or comply with requirements to which they are not already subject.

CME Group already has addressed these regulatory goals by requiring firms to use unique identifications, which are included as part of each order message sent to the exchange and maintained in the exchange's automated audit trail. Our regulatory databases capture hundreds of millions of order and trade messages, market data messages, cleared trade records and position records each day, which are integrated with

other reference data we maintain to provide a comprehensive view of CME Group markets. The CFTC has access to all of this information.

4. Can you detail some of the benefits that co-location has provided for CME customers? What are some of the disadvantages?

Because of facilities such as ours, every trader now has access to colocation. The criticism of colocation in some of the public coverage has failed to recognize that colocation actually equalizes access to the benefits of speed through proximity. It used to be that the benefit of speed from proximity was available only to traders who could buy real estate near an exchange, or where he or she thought the server would be. Because of colocation facilities such as ours, every trader now has access to colocation. This includes everyone from small retail participants to the largest of Wall Street banks. Everyone in our facility connects with the same length fiber to CME Globex so there are no unequal location advantages. Our colocation pricing is transparent and non-discriminatory, and uniform contract terms and policies are applied.

Senate Committee on Agriculture, Nutrition & Forestry
High Frequency and Automated Trading in Futures Markets
May 13, 2014
Answers to Questions for the Record

Andrei Kirilenko
Professor of the Practice of Finance
Sloan School of Management
Massachusetts Institute of Technology

Senator Chuck Grassley

Q1. Does the small randomness of latency affect all High Frequency Traders the same or do certain High Frequency Traders get information nanoseconds before others? (In other words do all High Frequency Traders get information at the same time even if they don't know the exact moment they will get it?)

A1. Trading system latency varies a lot and is not described by a bell-shaped distribution. This means that when an exchange announces that its average system latency is 3 milliseconds, it is not very meaningful. In practice, it can take an exchange 100 microseconds to process a trader's message or 25 milliseconds. Trading system latency is just that random.

There is usually nothing a trader can do about reducing trading system latency. It is simply a "risk factor". However, high frequency traders still fare better than everyone else, other than the exchange itself, in estimating the latency risk factor.

The most active HFTs – the ones that interact with the exchanges and trade the most – will be in the best position to estimate the distribution of latency, even if it's equally random to all traders. As with all other traders, the most active HFTs get records for each of their own actions (submission-modification-cancellation-execution), the so-called "drop copy", from the exchanges. Because they are extremely active, their own submission-modification-cancellation-execution records become valuable sources of information about how the distribution of latency changes over time. Most active HFTs can use this data to get the best estimates of latency risk.

Q2. You hypothesize that the randomness of system latency could be the reason that new entrants into the HFT market are limited. Assuming your theory is correct; do you believe exchanges will ever be able to predictably deliver information at an exact moment, even if that moment is measured in nanoseconds?

A2. My colleagues and I hypothesize that the ability to better estimate and take advantage of latency risk could be the reason why the HFT industry can remain immune from competitive market pressures.

I believe that greater transparency can significantly help improve the uneven playing field. To this end, I recommend that automated exchanges should be mandated to report historical system

latency indicators to all market participants. Since latency is drawn from a complex (not-bell-shaped) distribution, reporting period averages is not enough to describe this risk factor; the median and standard deviation of system latency must also be reported.

Historical latency indicators for all submitted, cancelled, modified, and executed orders for all listed contracts should be reported on a periodic basis – at first, daily and eventually, hourly, minute-by-minute or even more frequently, depending on what is appropriate for each specific asset traded. This would greatly improve the transparency of the trading process in automated exchanges and level the playing field between those automated market participants that can estimate how long a bid or offer is likely to be available for trading and those that cannot.

If the customers of some automated exchanges wish to receive latency information in real time and are willing to shift their trading business to those venues that provide such a service, then exchanges will need to make decisions on whether and how they could provide this service in order to remain competitive.

Senator John Thune

Q1. Do you believe that the CFTC can accurately and effectively define a high frequency trader for purposes of regulation and registration? Is there a danger of the definition becoming outdated due to the quick evolution of the market?

I recommend creating a broad definition of "automated brokers and traders" that would be similar to what used to be called "floor brokers and traders." The definition needs to be broad enough to cover the activity of all active proprietary traders. For example, if a trader is co-located directly or through a technology vendor (i.e., is located "at or near" the matching engine) and uses more than a certain (small) number of messages to communicate with the exchange (i.e., it is "active"), it should register as an automated broker and trader.

Just like the definition for "floor brokers and traders", this new definition might in time become outdated. However, it is time to first fix the problem we are currently facing – not being able to capture systemically important automated traders as registered entities – and then deal with future adjustments as needed.

Q2. There has recently been considerable press about the negative impact high frequency and automated trading has had on the equities markets. What are some of the similarities and differences between the equities markets and the commodity markets? Does it make sense to have the same controls for both or do controls need to be developed separately?

Equity markets have evolved into a fragmented collection of "lit" and "dark" trading platforms kept as one national marketplace by the Regulation NMS and one central clearing platform operated by the DTCC. Prior to the financial crisis, "lit" (exchange-traded, centrally-cleared and tightly regulated) futures and options markets and "dark" (over-the-counter, not-centrally-cleared and loosely regulated) swaps markets operated as almost entirely separate marketplaces.

Title VII of the Dodd-Frank Act aimed to integrate these two marketplaces into a single regulated market. Implementation of the rules finalized by the CFTC gave rise to the emergence of multiple Swap Execution Facilities (SEFs) and Swap Data Repositories (SDRs), as well as significant changes in the operations of the Derivatives Clearing Organizations (DCOs) and the derivatives exchanges known as Designated Contract Markets (DCMs). As a result, safeguards and controls that in the past may have been sufficient to cover vertically-integrated DCM-DCO silos are likely not to be sufficient to cover high frequency trading practices that may include trading on multiple SEFs and DCMs, reporting through different SDRs, and clearing through different DCOs.

To some extent, controls that cover trading on multiple trading platforms might in the future be somewhat similar in both securities and derivative markets, but separate new controls would need to be developed for the newly integrated derivatives market due to its fragmented reporting and clearing structures.

Q3. In your testimony, you provided several suggestions for protecting markets from instability caused by automated trading.
What do you believe would be the best way to implement these suggestions?

In my testimony, I stated that high frequency and automated trading lies in the intersection of regulation, finance, technology, and data processing. I then recommended improvements along each of these lines.

In the area of regulation, I recommended creating a broad definition of "automated brokers and traders" that would be similar to what used to be called "floor brokers and traders." Federal regulatory agencies should propose and finalize rules to do that.

In the area of finance, I recommended that regulators closely examine why market forces are not eroding the high concentration of the HFT industry. If necessary, this matter can also be referred to the Department of Justice.

In the area if technology, I recommended that automated exchanges (both DCMs and SEFs) should be mandated to periodically report system latency indicators for all of their listed contracts to all market participants. To that end, federal regulatory agencies must propose and finalize appropriate principle-based rules that mandate automated exchanges to do so for the benefit of greater transparency of regulated derivatives markets.

In the area of data processing, I recommended that automated exchanges broaden the use of short trading pauses and re-opening auctions. Automated exchanges are self-regulatory organizations and as such are well positioned to pass necessary regulations themselves. Federal regulators, however, should play a catalytic role in this process by creating appropriate advisory committees or subcommittees to keep the process moving forward and the key stakeholders engaged.

Senate Committee on Agriculture, Nutrition & Forestry
High Frequency and Automated Trading in Futures Markets
May 13, 2014
Questions for the record
Mr. Vince McGonagle

Senator John Thune

1. **The CFTC's Concept Release mentioned several risk controls the CFTC is considering. Would these controls be in addition to the risk controls already being utilized by commodity exchanges, codify the risk controls many exchanges already use, or a mixture of both existing and new controls?**

The Commission's "Concept Release on Risk Controls and System Safeguards for Automated Trading Environments" (Concept Release) was not a proposed rule but rather sought to begin a public dialogue concerning issues pertaining to automated trading in the derivatives markets. In order to foster that dialogue, the Concept Release discussed a series of 23 pre-trade risk controls, post-trade reports, system safeguards, and market structure and other measures relevant to automated markets. As noted by the Commission, the Concept Release was informed by controls already in use by one or market participants or exchanges. It also reflected best practices, recommendations and proposals developed by industry associations and working groups, such as the Futures Industry Association (FIA) and FIA's Principal Traders Group and Market Access Working Group; international standard setting bodies, including the International Organization of Securities Commissions (IOSCO); and other regulators, including the European Securities Markets Authority (ESMA). Public comments received in response to the Concept Release indicate that a number of measures raised in the document, such as pre-trade risk controls, already have wide acceptance within the industry.

In this regard, the Commission sought to inform itself as broadly as possible. For example, it sought information regarding the extent to which individual risk controls are already

in use by industry and the effectiveness of those controls. The Commission also specifically asked whether there is a need to standardize or provide greater granularity on risk controls, including through regulatory action. The Commission also sought to present a wide array of potential measures to capture the full range of ideas in the risk control space. Staff is evaluating all comments received and continues to consider these questions carefully, including any areas where new practices should be implemented or existing practices codified.

2. **How will the CFTC continue to work with the industry as the CFTC analyzes the comments to its Concept Release and weighs the decision whether or not to promulgate regulations regarding high frequency and automated trading?**

The Commission requested comment on the risk controls and other measures addressed in the Concept Release, enumerating 124 separate questions on the necessity and operation of such measures in today's markets. A 90-day comment period followed publication of the Concept Release. The Commission reopened the comment period from January 21 through February 14, 2014 in order to gather further comments. In addition, industry representatives discussed the Concept Release at a February 10, 2014 meeting of the Commission's Technology Advisory Committee.

The Commission received a total of 43 public comments on the Concept Release, and, together, these comments included detailed responses to all 124 questions in the document. Any staff recommendations to the Commission concerning potential rulemaking in areas addressed by the Concept Release will take into account all comments received.

As noted above, the Concept Release was not a proposed rule, but rather a document designed to engage a public dialogue to inform the Commission so that it may decidee whether any additional measures regarding high frequency and automated trading are appropriate. Any

subsequent actions following from the concept release would comply with the Administrative Procedure Act and would provide opportunities for public involvement.

3. **As you noted in your testimony, the CFTC is currently analyzing comments on the Commission's Concept Release. What are the CFTC's next steps? What is the timeline for implementing these steps?**

Staff continues to review all comments received and to refine its analysis of issues raised in the Concept Release. Potential risk controls in the Concept Release range from measures that are already widely accepted to proposals that require careful study. Staff is pursuing a deliberative approach so as to make the most appropriate recommendations it can to the Commission and the Commission can then consider what further actions might be appropriate.