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EXAMINING THE CAUSES AND LESSONS OF THE MAY 6TH MARKET PLUNGE

HEARING

BEFORE THE

SUBCOMMITTEE ON SECURITIES, INSURANCE, AND INVESTMENT

OF THE

COMMITTEE ON BANKING, HOUSING, AND URBAN AFFAIRS UNITED STATES SENATE

ONE HUNDRED ELEVENTH CONGRESS

SECOND SESSION

ON

EXAMINING THE CAUSES AND IMPLICATIONS OF THE MAY 6, 2010, MARKET PLUNGE AND IDENTIFYING WHAT POLICY CHANGES MAY BE NECESSARY TO PREVENT SUCH EVENTS FROM OCCURRING AGAIN

MAY 20, 2010

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THURSDAY, MAY 20, 2010

WITNESSES

EXAMINING THE CAUSES AND LESSONS OF THE MAY 6TH MARKET PLUNGE

THURSDAY, MAY 20, 2010

U.S. SENATE,
SUBCOMMITTEE ON SECURITIES, INSURANCE,
AND INVESTMENT,
COMMITTEE ON BANKING, HOUSING, AND URBAN AFFAIRS,
Washington, DC.

The Subcommittee met at 9:37 a.m. in room SD–538, Dirksen Senate Office Building, Senator Jack Reed, Chairman of the Subcommittee, presiding.

OPENING STATEMENT OF SENATOR MARK R. WARNER

Senator WARNER. [Presiding.] Good morning, everyone. Obviously, I am not Chairman Reed. He is on his way back from the Pentagon and will be here momentarily, and so as the guy that usually sits at the other end of the dais, I get a chance to at least open the hearing, and I will relinquish the gavel once Chairman Reed gets here.

I want to thank both Chairman Schapiro and Chairman Gensler and our other witnesses today for coming. I think we all saw recently, on May 6th, how challenging the merging of the advance of technology, high-frequency trading, and some of the results of perhaps not having totally in place all of the appropriate circuit breaker, stopgaps, and other tools that may be necessary to make sure that we do not see a repeat of $1 trillion, 15-minute or 21-minute loss that took place on that day.

Obviously, bringing both this first panel of regulators and then our second panel in today is very timely since at the same time on the floor of the Senate, we are now, I think, in week 4 of putting in place new rules of the road for the 21st century for all of Wall Street and our whole financial system.

Chairman Reed was going to talk—and I am sure he will come back and mention this again—about specifically what happened on May 6th. I definitely recall, you know, getting panicked calls from some of the folks who manage my investments to say, you know, we do not know what is happening, and to see this $1 trillion loss. I heard the day after that a loss of actually a series of smaller brokers who were really questioning the whole integrity of the system, what happens when you have that kind of precipitous loss, precipitous decline in values, then obviously the market responded. But an awful lot of small investors who, I think, over the last 2 years have had a bit of their confidence robbed by the market falls in 2007 and 2008. But then to have this action, whether it was tech-

nology-driven, whether it was a result of the overall actions of the dramatic increase of high-frequency trading, is something that I hope we will be able to get to in this hearing today.

There is a series of other comments that Chairman Reed was going to make, which I will pass on at this point since I have got a series of similar type questions once we get to hear from the witnesses. Let me introduce our first panel of witnesses, and then I am going to turn to Ranking Member Bunning and my good friend Senator Corker, although I do not know if with only three of us here we are going to enforce the Corker rule of opening statements or not. Let me go ahead and introduce our two witnesses; then I will turn it over to Senator Bunning.

Our first witness will be Honorable Mary Schapiro. She is the Chairman of the Securities and Exchange Commission. Prior to becoming SEC Chair, she was CEO of FINRA, the largest nongovernmental regulator for all securities firms doing business with the U.S. public. Chairman Schapiro previously served as Commissioner of the SEC from December 1988 to October 1994 and then as Chairman of the Commodity Futures Trading Commission from 1994 until 1996.

Our second witness is the Honorable Gary Gensler, Chairman of the Commodity Futures Trading Commission. He previously served at the U.S. Department of Treasury as Under Secretary of Domestic Finance from 1999 to 2000, as an Assistant Secretary of Financial Markets from 1997 to 1999. Prior to joining Treasury, Chairman Gensler worked for 18 years at another firm—at Goldman Sachs—and most recently as partner and co-head of finance.

With those introductions, I will turn to Senator Bunning and then Senator Corker, if he chooses.

STATEMENT OF SENATOR JIM BUNNING

Senator BUNNING. Thank you, Senator Warner.

Welcome to the two witnesses we have before us. In many ways, this hearing is the follow-up to the hearing we held in this Subcommittee last October on securities and market structure issues. Many of the topics we discussed at that hearing are in the spotlight again after the May 6th stock market drop. I am glad to see the SEC followed through on its commitment to us last fall to start a broad examination of market structure issues.

Technology certainly has changed the way securities and futures are traded, and the SEC has made significant rule changes over the last decade. But no one in Government has paused and thought about how all those changes work together.

From what we know so far, it appears that 2 weeks ago the markets worked as they were supposed to, according to the rules and systems that were in place at the time. A broad examination of all the marketplace changes might have revealed the possibility of a sudden drop under the conditions that existed 2 weeks ago. And, in fact, at least one commentator to the SEC market structure study suggested just such an outcome. Of course, that leads to the question of what else could happen.

That is why I think it is critical for the Commission to complete the market structure study and not let other matters sidetrack it. I appreciate the speed and seriousness both the SEC and the CFTC

have put into the investigation of the May 6th market drop. Putting in place rules, uniform rules, for pause trading across all exchanges seems like a good first step, and I am glad everyone resisted the temptation to make sweeping changes before first understanding everything that went on. I think it is also important that the trading halts will apply for price changes in both directions, not just in drops. But I also have some concerns about the reaction and what we do not know.

First, since markets appear to have worked at they were supposed to under the rules in place, I am very concerned that trades were canceled on an arbitrary basis. Very concerned. That is unfair, undermines market discipline, and is nothing more than a bailout of sellers who would have faced losses from their own decisions to use market orders.

Second, it is troubling that we do not yet understand the relationship between movers in the futures markets and the stock markets.

Third, it is also troubling that some traders who claimed to be market makers, particularly high-frequency traders, pulled out of the market, thus contributing to the drop.

Finally, I am also bothered that we do not understand why exchange-traded funds suffered worse losses than the securities they were supposed to be tracking.

I hope our witnesses can shed some light on these concerns or at least explain what is being done to get to the answers. Thank you both for being here, and I await your testimony.

Senator WARNER. Senator Corker.

Senator CORKER. I do not have any comments. I look forward to the testimony, and thank you for coming.

Senator WARNER. Again, my thanks to the witnesses, and I think we are all very looking forward to your testimony and our questions afterwards.

Chairman SCHAPIRO.

STATEMENT OF MARY L. SCHAPIRO, CHAIRMAN, SECURITIES AND EXCHANGE COMMISSION

Ms. SCHAPIRO. Thank you very much. Senator Warner, Ranking Member Bunning, and Senator Corker, I appreciate the opportunity to testify today and update you on our ongoing review of and response to the market disruption of May 6th.

During a 20-minute period on that afternoon, the U.S. financial markets failed to execute their essential price discovery function, experiencing a decline and recovery that was unprecedented in its speed and scope. That period of gyrating prices both directly harmed investors who traded based on flawed price discovery signals, and it undermined investors' faith in the integrity and fairness of the markets. Today we continue to work to identify the events that triggered the unusual volatility, to better understand the various aggravating factors, and to adopt measures that will help prevent similar market disruptions.

Over the last 2 weeks, the SEC has moved forward on two separate, but related, fronts. First, along with the Commodity Futures Trading Commission, we have been engaged in a comprehensive investigation into the causes of the events of May 6th. On Tuesday,

we released a staff report detailing the preliminary findings of our investigation to the Joint CFTC–SEC Advisory Committee on Emerging Regulatory Issues, and this report was also made public.

Second, we have worked with the exchanges to fashion measures that will help protect against a recurrence by imposing a limit on the extent to which certain individual stock prices can move before trading in that stock is paused. While it will take time to fully analyze the extraordinary amounts of data from a day in which more than 19 billion shares of stock were traded and to cross-test different hypotheses, our investigation is focusing on the following issues: the possible linkage between the steep decline in the prices of stock index products and simultaneous and subsequent waves of selling of individual securities; a generalized severe mismatch in liquidity, possibly exacerbated by the withdrawal of liquidity by electronic market makers; the possibility that this liquidity mismatch may have been aggravated by disparate trading conventions across the exchanges; the impact from the use of "stub quotes"; the use of market orders and stop loss orders that might have contributed to market instability; and the impact on exchange-traded funds, which suffered a disproportionate number of broken trades.

We have discovered no evidence that these events were triggered by "fat finger" errors, computer hacking, or terrorist activity, although we cannot yet completely rule out these possibilities.

At this stage we continue to focus on the events that may have triggered the unusual volatility. But regardless of the cause, we believe that the initial volatility was magnified by a variety of factors. So as we work to determine why the first domino fell, we have taken an important step toward preventing future disruptions, working with the exchanges to develop rules which would impose uniform, market-wide standards for pausing trading of securities in the S&P 500 index if a securities price moves 10 percent or more in a 5-minute period.

These proposed rules would establish a 5-minute trading pause designed to give the markets the opportunity to attract additional liquidity in the stock, to establish a reasonable market price, and to resume trading in a fair and orderly fashion. The rules have been published for comment promptly so that they can be evaluated as soon as practical and quickly adopted.

Once adopted, the new rules would be in effect on a pilot basis through December 10, 2010, during which time the exchanges may propose appropriate adjustments to the parameters or operation of the circuit breaker. In addition, we understand that the exchanges will quickly work on expanding the program to include other securities, including ETFs.

The SEC staff is also working with the exchanges and will coordinate with the CFTC to consider recalibrating the existing market-wide circuit breakers—none of which were triggered on May 6th.

SEC staff is also examining ways to address the risks of stop loss and market orders and their potential to intensify sudden price declines, as well as steps to deter or prohibit the use of stub quotes, and we will review the impact of other trading protocols, including the use of trading pauses by individual exchanges and self-help

protocols that allow the markets to avoid routing to exchanges that are perceived to be responding too slowly.

Very importantly, and on an expedited basis, we will push the exchanges to propose clear, transparent, consistent, and fair rules for the breaking of trades that are clearly erroneous.

Even before May 6th, the Commission had launched initiatives to strengthen the U.S. securities markets and to protect investors. We have proposed rules that would prohibit flash orders, increase the transparency of dark pools of liquidity, prohibit broker-dealers from providing unfiltered access to exchanges, and create a large trade-reporting system. And earlier this year, as has been mentioned, the SEC issued a concept release on market structure that solicited public comments on the impact of different trading strategies, including high-frequency trading, on our markets and investors. These issues will also be the center of a market structure roundtable which we will be holding early next month. And next week, the Commission will consider a proposal to create a consolidated order-tracking system to allow effective cross-market surveillance of equities trading.

In conclusion, we are making progress in our ongoing review, and we have begun putting in place safeguards that will help prevent this type of unusual trading activity from repeating. I look forward to working with Congress on these issues in the coming weeks, and, of course, I would be pleased to answer any questions.

Thank you.

STATEMENT OF GARY GENSLER, CHAIRMAN, COMMODITY FUTURES TRADING COMMISSION

Mr. GENSLER. Good morning, Chairman Reed, Ranking Member Bunning, Senator Corker, Senator Warner. Thank you for inviting me here today. I am pleased to testify alongside Chairman Schapiro.

As she mentioned, the CFTC and SEC staff released a joint report Tuesday that presented preliminary findings regarding the May 6th market events, and I just wanted to thank the staffs of both agencies for working tirelessly and cooperatively to issue this detailed report in such short order. I think it was a high level of cooperation and public service that got this to you and to the public so quickly.

This morning I will focus my testimony on the proposal issues in the futures marketplace, as Chairman Schapiro has addressed the securities markets more broadly. But before I turn to those specific events of May 6th, I would like to discuss just the make-up of the stock index futures markets. These market stock index futures are derivatives contracts that are on central exchanges, and by far the most active—about 80 percent of that market—is a contract called the E-Mini S&P 500. It is based on 500 of the largest stocks. These are traded electronically, as you know, and we have moved toward electronic markets where about 88 percent of the futures markets today more broadly are done on electronic platforms, as opposed to in the old days when people were in the pits in an exchange.

There is also something called algorithmic trading, which refers to the practice of using computer algorithms to direct order entry into electronic trading platforms. And in some cases, an investor

chooses an algorithm by making only a few clicks, a pull-down window, just as on your home computer, provided by the executing firms.

In this new environment, the futures markets do have automatic safety features to protect against the errors of order entry and extreme price swings. But I do think that we need to review whether further protections are needed in these fast-paced, computer-driven markets. And though additional review is necessary, preliminary staff findings suggest that a confluence of economic events, signals from other markets, and a marked increase in sell orders culminated in the significant decline and dislocations of liquidity in this E–Mini contract, this futures contract.

May 6th began with turbulent skies in the marketplace. Many financial news outlets were reporting the uncertainties emanating out of Europe, and volatility in the middle of the day actually reached 61 percent higher than the prior day just in terms of a key market measure. Market participants also would have observed a number of indicators coming out of both the futures and securities markets. From the futures markets, they saw a flight to quality—to U.S. treasuries, to currency, to gold. And the securities markets, after 2:00 p.m., they started to see significant increases in what you will hear about later, liquidity replenishment points of the New York Stock Exchange where stocks went into go-slow mode, but also significant price drops in exchange-traded funds, as was mentioned by Senator Bunning.

On May 6th, we also saw significant dislocations in liquidity in this E–Mini contract, and between 2:30 and 3:00 p.m. though there was 10 times more volume—normally, higher volume people think of as better liquidity, there is more trading—actually our economists reviewing it have shown that there is evidence that bid-offer spreads, the difference between where people will buy and sell, widened out and also the order books started to have an overwhelming abundance of sell orders when you look at the details.

By just before 2:45, a number of large traders began to limit their involvement in the marketplace of the E–Mini, and at 2:24:28 to be precise, the Chicago Mercantile Exchange, one of their risk management structures kicked in, a go-slow or a pause called a stop logic functionality, and for 5 seconds the market paused. And, in fact, then it started to move back up after that pause.

Now, we have reviewed at the CFTC the trading activity of the ten most active accounts on both the long and the short side. We are reviewing many others as well. But of those top ten, the predominant ones, nine out of them actually appear to be both on the long and the short side. There was one using algorithmic execution strategies that was only on the sell side and represented approximately 9 percent of the activity over 21 key minutes, from 2:32 to 2:51.

They used a volume restriction which they put into the computer system of their executing broker, a volume restriction which in other days would have taken that volume and put it out in probably as much as several hours. But on this day, with 10 times higher volume on the critical hour, the volume was placed over 21 minutes. And it may well be that the volume restrictions that on an average day would have helped to limit the down draft of the mar-

ket may have been ineffective and actually limited what they had hoped to be the market impact.

The CFTC will continue its analysis, working jointly with the SEC on these matters, and I look forward to taking any questions that you have today.

Senator REED. [Presiding.] Thank you.

I would like to call on Senator Bunning.

Senator BUNNING. Thank you. This is a question for both of you. Thank you for your testimony. Chairman Schapiro, I will start with you, but I would like both of you to answer the question.

As I said in my statement, I am concerned about some of the ways trades were canceled. Do you think that was the right decision? And what role did your agencies play in it?

Ms. SCHAPIRO. Senator, the process for breaking trades is one that is done under exchange rules, not by the Government. Exchanges work out a common standard for how far away from the last valid price will they break trades. In the case of May 6th, they determined that for trades done between 2:40 and 3 o'clock they would break trades that were done 60 percent or more away from the last valid price at 2:40 or before 2:40.

That resulted in almost 21,000 trades being broken. About 59 percent of those were on NASDAQ, about 5 percent on BATS, and the others were spread out more broadly. And the exchanges can obviously speak to the rationale behind selecting the 60 percent number in the next panel, but, frankly, it feels quite arbitrary, as I am sure many people think who had trades that were broken that they did not want broken or those who had trades not broken at 50 percent or 40 percent or 30 percent.

I think going forward we need a process that is much more transparent, provides certainty in advance about what trades will be broken and which ones will not, and creates fairness for investors. And so I would say that having gotten the circuit breaker rule proposals in, my top two priorities now as we continue to drive this process forward is to get the exchanges to propose new, clear, consistent, and fair rules for breaking trades within the next 2 weeks, and then to expand the pilot program to include stocks beyond the S&P 500.

It is not a process that has left investors feeling at all good about our marketplace, and we have got to fix it as soon as we can.

Mr. GENSLER. Senator, in the futures marketplace, there are exchange rules about breaking trades. They are very clear and tight. They have to happen within a very short number of minutes where one of the parties comes in. There were no futures trades broken on May 6th as it was. But I do share Chairman Schapiro's views in the broader context that rules for such breaking of trades need to be clear and consistent, and the public needs to know in advance these rules.

Senator BUNNING. Ms. Schapiro, it is hard for me as someone who worked in the market for 31 years to understand how any trades can be broken arbitrarily by an exchange, especially those rules that you stated. Those are arbitrary rules. And for someone who is left out of those arbitrary rules—in other words, did not fit in the box—how do you think they feel?

Ms. SCHAPIRO. I think they probably feel terrible, and I would as well if I were in that position. And that is why the rules have got to have clarity, and they have got to provide certainty up front so people understand that if a trade is executed because of a "fat finger" problem, a technology problem, whatever the reason is, that is executed 30 percent or 20 percent away from the market, that those trades will be broken without discretion, or they will not be broken. But people need to understand that up front. When people enter the marketplace, they need to know what the rules are that will apply.

Breaking trades also discourages buyers coming in at a very low point and providing liquidity, for example, because their trades may be broken as well. So why would they go——

Senator BUNNING. In other words, those ones that were done at 1 cent—are those some of the trades that we are talking about?

Ms. SCHAPIRO. Absolutely. Several hundred securities that had trades executed against stub quotes at a penny or 5 cents are very likely to be 60 percent away from their last valid price.

Senator BUNNING. They were.

Ms. SCHAPIRO. And they will almost—they will certainly be broken.

Senator BUNNING. OK. The second question for Chairman Schapiro. Have you found that any market makers with obligations to stay in the market did not perform on their obligations? And do you think the rules for market makers need to be adjusted to reflect the greater role of new types of liquidity providers?

Ms. SCHAPIRO. We do not have evidence yet of market makers who had affirmative obligations withdrawing from the market. It is absolutely something that we are looking at, and we have incorporated our Enforcement Division into our ongoing investigation. We have close to 100 people at the SEC working on this inquiry.

I do believe one of the things we absolutely have to look at is the fact that many affirmative obligations of market makers have been eliminated by the markets over the years. And that is how we end up with stub quotes. The obligation to provide a two-sided quote used to be required to be reasonably related to the market price, no longer is in all cases, and we end up with, you know, a spread of 1 cent to $100,000. And that is just unacceptable.

So one of the things we will be looking at very carefully is the creation of affirmative obligations again.

Senator BUNNING. The only reason I bring that up is that market makers make their money on the spread or whatever little chunk they take out as being a market maker. At least that is the way it was for the 31 years that I dealt with market makers. In fact, in some of the over-the-counter stocks that I sat on the over-the-counter desk, we took a quarter of a point out of each trade, and, therefore, it was built-in profit for the company that I worked for.

I do not think a market maker should be able to get out of the market they are making the markets in that stock under any circumstances, unless they are belly up.

Ms. SCHAPIRO. As the markets have evolved, there are other benefits as well of being a market maker. It might be fees and rebates. It might be preferential capital or margin treatment and so forth.

So to the extent there is a benefit from being a market maker, my view is there ought to be obligations and responsibilities that go along with that.

Senator BUNNING. I have used up my time. Thank you.

Senator REED. Thank you, Senator Bunning.

And I want to thank Senator Warner for initiating the hearing. I was at the Pentagon. Senator Warner.

Senator WARNER. Thank you, Mr. Chairman.

I want to continue a little bit along the line of Senator Bunning. I also had some concerns about the arbitrariness of what the standards are of breaking trades, but you have got to draw a line somewhere. I think, clearly, both of you have acted quickly in terms of circuit breakers, pauses, other tools we can use.

I have got to tell you, though, I still have some concerns, and I am not being critical here, I am just seeking the answer. We are a couple weeks after the fact. We still don't know how this event happened in the first place and what were the precipitating causes. I keep coming back to, as an advocate for technology, but technology—here, we may be seeing technology for technology's sake alone, speed for speed's sake alone, and at some point as we—and I have this gut sense that whether it is, and I appreciate what you have done, Chairman Schapiro, in terms of flash trading, but this whole new area of high frequency trading, dark pools, collocation, sponsored access, a lot of the firms are doing this, my sense is, to try to get a competitive advantage in the marketplace.

And how do each of your institutions keep up knowledge-wise monitoring these activities? How do you make sure you have got the technology expertise? I know we have had some conversations where you have to rely on a series of these exchanges to actually get data back because you don't have real-time access to that kind of information in the first place. I would love to hear—I appreciate what you are doing circuit breaker-wise. I appreciate the need to get an ability to break some of the trades when you have got this blip or problem in the market. But how do we get ahead of this? Have we seen on May 6 what may be the first kind of warning shot of what may be the next potential systemic crisis because of technology run amok?

Ms. SCHAPIRO. Well, let me speak a little bit about how I have tried to approach this in the little over a year I have been at the Commission, because there are absolutely enormous challenges to regulating this highly dispersed and fragmented marketplace we have in the equities markets. Depending on how you count, there are 50, 60, 70 venues where trading is taking place. Some of them are dark. Some of them are less opaque. Orders are handled differently. The protocols and how trading is paused or not paused is different across all of them.

We peeled off a few issues we thought were really critical during the fall. Those related to making dark pools more transparent so that we would not develop a two-tiered system where retail investors would not have access to the best quotes. We proposed banning flash orders. We proposed prohibiting unfiltered access, where large customers can go directly into an exchange and not pass through the risk management controls of a brokerage firm. We proposed instituting a large trader reporting system so the SEC would

have access to the activities that are engaged in by large traders. Those, we felt, were really critical "of the moment" issues we needed to get started on.

And then in January, we published this very broad concept release where we asked a lot of questions about what is the impact of high frequency trading on retail investors, on the health of our markets, on the ability of public companies to raise capital, the whole reason our markets exist at the end of the day, and we have received over 100 comment letters on that. The comment period just closed and we will proceed now to try to pull all of these pieces together and figure out how we go forward.

At the end of the day, our goal has got to be that our markets operate fairly and efficiently and effectively for all the constituencies, and I put at the top of that list public investors and public companies. And then those who trade for a living, playing an important role. But at the end of the day, our markets have to be about investors and the ability to raise capital. So that is how we are going forward on these issues.

Senator WARNER. And before Chairman Gensler answers, and I know I have only got a minute left, I guess, Chairman Gensler, in your testimony, you described some of the tools some of these institutions use in terms of "sniping" and "sniffing" strategies, where you put out a major order and you have got an immediate recision component to it to kind of sniff out where the direction of the market is headed.

If you are a small retail broker or a small-time trader, or if you are a company that is seeing your stock potentially manipulated, how do we get to that level of confidence when it seems like certain institutions are using not greater investigatory knowledge, but really just technology, in a sense, to game the market?

Mr. GENSLER. Well, I think you are absolutely right. The technology has advanced the markets from the humans on the floor of the New York Stock Exchange or the floor of the Chicago Mercantile Exchange to these high frequency. The trades are down to milliseconds and nanoseconds. There are risk management standards in place in the futures markets, but I do think that we have to review them and see whether and where we can do better in this regard.

You also asked about how we stay ahead. We are fortunate in the futures market—and this preceded me—that we get the data the next day. We get all the data in and we are able to query it, access it, and review that data down to the, if need be, the order book itself. But in terms of, you mentioned sniping and sniffing, it is how a computer puts in a very small order, maybe one future contract, and sees whether it is addressed or hit and lifted, and then it will put in more and so forth.

We don't know yet whether that was a piece of what was happening May 6. We do have enough knowledge that the automated execution systems—there is the platform at the futures exchange, but then there are platforms that are in the executing brokers, that there was at least in this one circumstance, this one sell order, that on other days may have taken as many as hours to execute came into the market in those critical minutes. We are going to continue to look at that and see whether there are appropriate new rules

with regard to this very real reality. We can't stop technology, but I think that we have to update our regulations to stay abreast of this.

Ms. SCHAPIRO. Senator, could I just add that we can't unplug the machines, but what we can do and are doing with things like circuit breakers is giving the opportunity for the human intervention to come back into the market, to apply rational thinking and thought, to pause a market and reopen it in an orderly and effective way that serves all investors' interests. So we have got to get that balance right between when the technology, which provides benefits, is allowed to run and when it is not allowed to run because it has run amok and we can put the human factor back into it.

Senator WARNER. My time has expired, Mr. Chairman, but I just would love to revisit, maybe in a second round, do you have the technology to stay abreast of the folks on the other side.

Senator REED. Thank you, Senator Warner. We will have a second round.

Senator Corker.

Senator CORKER. Thank you, Mr. Chairman, and thank you for your testimony.

Why is there a circuit breaker on the way up?

Ms. SCHAPIRO. Interestingly, there were five securities whose stocks were executed at $100,000, going up very, very dramatically. Apple was one. So the people are disadvantaged when they buy a stock at a $100,000 price as much as someone has been disadvantaged when they sell at the penny, and so it is the other side of the quote. So our view is, and the market's view, because these are the market's rules, was that fairness really dictates that the circuit breaker work in both directions.

Mr. GENSLER. And if I might add, in the futures marketplace, the very small pauses, these five- or ten-second pauses that are across all the futures contracts, are about allowing liquidity to come back in. Sometimes in the nanoseconds, there aren't a sufficient number of buy orders or sell orders, so it is about liquidity pauses. In the futures market, it is five or 10 seconds. And so it is to make sure there are orderly markets. We are not a price-setting agency at the CFTC. It is about orderly markets.

Ms. SCHAPIRO. Nor, of course, is the SEC.

Senator CORKER. So after 5 minutes, you have this breaker. Is there any issue with how trades are—what order they are traded in after that? I assume there is a back-up of trades, so how do you decide what gets executed after that 5-minute circuit breaker?

Ms. SCHAPIRO. The primary listing market will be responsible for reopening the trading after the 5-minute pause, so during that period, they will be trying to attract liquidity and establish a new price for reopening a security. They will do it really just the way they do it now when there is a halt, as we have for news pending in the markets today. I am sure they can answer that question on the next panel in much more detail.

Senator CORKER. So there is no issue there?

Ms. SCHAPIRO. I am sure as we put these rules out for comment, I am sure there will be many very specific technical implementation issues that we will have to work through during that 10-day

comment period and then before the markets implement the circuit breakers and even while they go through their testing of circuit breakers.

Senator CORKER. You know, the whole issue—I know there have been a number of questions regarding breaking trades, so we have this situation where we engaged in a lot of technology, where people, the thing they are most concerned about is how close they can locate to the exchanges and how quickly, and so that all works to the good. And then on the other hand, we break trades when things get out of alignment. It just feels incredibly arbitrary and doesn't feel like the kind of—why do we do that?

Ms. SCHAPIRO. I agree it feels——

Senator CORKER. On one hand, we create these tremendous advantages, and then when it doesn't work well, we figure out a way to make it work well.

Ms. SCHAPIRO. Well, in fact, that is one of the reasons for circuit breakers. It is our view, and I believe it is the market's views, that circuit breakers should dramatically decrease the number of trades that have to be broken because of a price that is clearly erroneous. Where there are better linkages among the exchanges with respect to things like circuit breakers or liquidity replenishment points or volatility halts and all of these things earlier on, we probably wouldn't have had anywhere near the number of broken trades.

It is not a good position for us to be in where we are cleaning up afterwards, and that is what breaking trades is about. We need to have up-front the protection, like circuit breakers, that should diminish the number of trades that might ever have to be considered to be broken. I am sure we will never eliminate them entirely. There will be people who make mistakes when they enter orders. But they should be minimized.

Senator CORKER. So it is rare that both of you all would be here, and I think you both know I respect both of you and enjoy working with both of you. But since you are both here and it is just the two of you, could you explain any rational reason that both the CFTC and the SEC exist?

Ms. SCHAPIRO. I assume you meant as separate agencies——

Senator CORKER. That is correct.

Ms. SCHAPIRO.——as opposed to existing at all.

[Laughter.]

Senator CORKER. No.

Ms. SCHAPIRO. You know, obviously, Chairman Gensler will want to speak to this, as well. I have chaired the CFTC and now the SEC. I have had tremendous experience with both agencies. They are both populated with incredibly talented and hard working and committed people. It is my view that if we were creating a regulatory system afresh, we would not have two separate agencies. The market participants largely overlap. The products tremendously overlap, and we know that from the debate in regulatory reform. The issues between our two agencies are coextensive.

So I think, were it up to me, and, of course, it isn't, we would have one agency. We don't, and so Chairman Gensler and I are hugely committed to working very closely together, and I think the work over the last 2 weeks demonstrates that we are capable of doing that.

Mr. GENSLER. The first part of your question, we exist to protect the markets and the public——

Senator CORKER. I know——

Mr. GENSLER. And the second part of your question——

Senator CORKER.——why you all exist separately——

Mr. GENSLER. Yes. But the second part of your question really dates back to the 1930s, when our predecessor and the SEC and when President Roosevelt came to Congress and asked that two agencies be set up, one to oversee what was then called the commodities markets, and then the securities markets, our oversight was on derivatives contracts, call it futures, and it has been the will of Congress for about seven or eight decades now to have two agencies.

I do think that we have worked very well together, not just the two of us, but, I mean, the staffs of these two agencies, and we are working very well with Congress now to fill the one big gap, the over-the-counter derivatives marketplace, to make sure that we cover that.

Our focus at the CFTC has been largely on derivatives contracts on exchanges and the SEC, though we cover a lot of the same market participants, is on the issuer public and, of course, the asset managers under the Investment Company Act and the accounting regimes and so forth. So we have complementary regimes, and it has been the will of Congress that that is the way we have been for seven or eight decades.

Senator CORKER. Well, thank you both. I really do think you have great staffs and certainly appreciate working with you all. I just, as I see you sitting here, realize another issue—we certainly have not dealt, in my opinion, with one of the core issues regarding this last financial crisis with this bill, and then, again, lack the courage as a House and Senate to deal with a very obvious issue, and that is that the two agencies are separated. But again, we deal with everything in the world in this bill but some of the core issues that need to be dealt with.

But I thank you both for being here and I am sure you all will remain separated for many years.

Senator REED. Thank you, Senator Corker.

Thank you for your testimony. One of the most potentially disturbing aspects of the testimony is that—and again, I want you to clarify it, will give you an opportunity to clarify it—is that you are both not quite sure what exactly happened. It was a confluence of events, but as I understand the testimony, the precise sequence, the precise causative factor among these has not been identified yet. Is that a fair statement? Chairman Schapiro and then Chairman Gensler.

Ms. SCHAPIRO. It is a fair statement. You know, it has been 2 weeks. Our staffs have been working around the clock. But there is an extraordinary amount of data that we have to plow through. And we are disadvantaged, quite honestly, on the equities side by the fact that we have so many different trading venues. We do not have a consolidated audit trail, which is why the Commission will be voting on that next week, to create one for the first time.

But we had to get audit trail data from the options exchanges, from the NASDAQ and the New York Stock Exchange. Other mar-

kets, like BATS and ISE and NYSE Arca that don't even keep full audit information, they just have simple books and records requirements. We had 19 billion shares traded that day in 66 million different trades. Seventeen million of them alone were between 2 and 3. So the enormous amount of data coming from multiple sources in different formats, captured in different ways, is creating an enormous amount of work for us.

Our technology, I think as you know, Senator, is not great. It has fallen behind over the years, and our capacity to even handle the terabytes of data that we are getting slows us to a halt sometimes while our systems kind of catch up and allow us to continue our work.

So I will say that I think the staff is doing an extraordinary job. We need to get them the technology resources. We are actually looking at bringing in a third-party firm to help us crunch the numbers. But over the longer run, this agency has got to have the capability to process this kind of information quickly and effectively so we can reconstruct markets and understand exactly where our problems are.

Senator CORKER. Chairman Gensler?

Mr. GENSLER. Though there is enormous work yet to be done, I might lean into this a little bit more than my staff would want, but I think the combination of events, the economic news that was coming out of Europe, and by the middle of the day, there was definitely a lot of uncertainty in the market. There was additional uncertainty that was coming from market signals. Sometimes market signals are fundamentals, like jobs data, or in this case what was going on in Europe. Sometimes the trading data, and we saw a lot of trading data in Treasuries, in currency markets that were higher uncertainty, and even when the New York Stock Exchange started to have some of these securities go into slow mode or the self-help modes, all that market data brings you to about 2:30 on that day and the market is down two to 3 percent.

At that point, our review, because we have been able to look in the futures markets with CFTC, and for all the reasons Chairman Schapiro said, we still have a lot more work to look into the cross-linkages of the securities to futures, but in the futures markets, we saw liquidity dislocations where really sell orders were far outstripping buy orders in the critical minutes into the V, the downward drift.

In the midst of that, some liquidity providers that don't have an obligation to be in that marketplace did start to limit their participation in the critical minutes before 2:45. In addition, we did have one sizable sell order in the midst of that put in an automated execution system and through an automated execution system, through a little pop-down window—we have even sent staff to look at the pop-down windows—is able to put in, limit my participation to about 9 percent, because I thought it wouldn't have a market impact. Well, on this day, that might have been a different feature, in some of those critical moments.

So those are some of the factors that we have looked at. We still have to prove out some of the theories. There are a lot of cross-linkages that we are going to study together.

Senator REED. Based on that, and again, I want your comments, is that you cannot assure us that this problem would have been self-correcting given the market mechanism in place, is that a fair judgment?

Ms. SCHAPIRO. Well, I think the fact that the market bounced back so quickly and prices recovered so quickly suggests that there may well have been sufficient liquidity present, but the markets couldn't get to it. It wasn't detected or it wasn't accessible. That, to me, is a market structure problem, which is why we are doing circuit breakers as a way to sort of pause the market, try to bring that liquidity back where it is accessible again by the other side. It is why we are looking at things like the use of market orders, stub quotes, stop loss orders, and all of these other issues.

But if you are asking me, can we guarantee this won't happen again tomorrow, I wish I could tell you that I am, but we can't, and it is why we are moving so quickly.

Senator REED. Well, another way to look at the issue is that this was an unusually disruptive situation in which there was a recovery. We don't know really what factors caused it and what factors we have to control, and we also really don't, I think, know what factors caused the recovery, the rapid recovery.

So there is a distinct possibility that this situation might not have naturally bounced back, but it could have deteriorated further to a point at which the markets were paralyzed and the fall would have been much more severe. Without being hysterical about these things, does that possibility exist?

Ms. SCHAPIRO. I think because we really don't know all the answers yet, I think that possibility does exist.

Mr. GENSLER. We do know one thing about the recovery in the largest futures contract, this E-mini contract, that it took a 5-second pause. There was in the automated system at the Chicago Mercantile Exchange, called Globex, it has a liquidity stop. It is called a stop logic functionality, words I hope to forget one day——

Senator REED. Sounds like here.

[Laughter.]

Mr. GENSLER. Yes. But nonetheless, that 5-second pause to allow more orders to come into the book was coincident that the market in that contract moved up at the end of it. Seven seconds later, broad market exchange traded fund, about a $100 billion fund called Spiders, 7 seconds later, that started up, and then the cash markets, anywhere from 15 seconds to 2 minutes later started up, because that is the natural progression.

Senator REED. You know, again, we can't be alarmist, but we have to be very sort of tough minded about what potential problems exist there. One could suggest that with all these good things happening in Spider and the self-correcting logics, had suddenly the government of Greece announced that it was suspending all of its payments, those things would have been, I think, might not have been sufficient.

So the point I think we have to look at, also, is what are the stand-by arrangements that if you can't get this right, that if the circuit breakers don't kick in correctly, what are those stand-by arrangements? And, I would dare say, will those arrangements be in

place in the future? Chairman Schapiro, and then I will ask Chairman Gensler.

Ms. SCHAPIRO. Senator, we do have in existence and have since the 1987 crash—I guess it took about a year to put these circuit breakers in place, but there are existing now market-wide circuit breakers. They have actually only been triggered, I think, once in the last 20-plus years that they have been in place. So if the market goes down 10 percent before 2, and it is based on the Dow, it is halted for an hour. Between 2 and 2:30, it is halted for 30 minutes, and so forth, and there are different lengths of halt at a 10-percent decline in the Dow, a 20 percent decline in the Dow, and a 30 percent decline in the Dow. And at a 30 percent decline in the Dow, the market shuts for the rest of the day.

So there is that ultimate fall-back we have in the market-wide circuit breakers. They have rarely ever been triggered. It is a pretty strong signal of big problems if they are triggered, and that is the reason we want to recalibrate those.

Senator REED. What I presume that does is give you time to act.

Ms. SCHAPIRO. Absolutely.

Senator REED. What actions can you take, not just the SEC, the CFTC, but Federal regulatory authorities?

Ms. SCHAPIRO. Well, I think that the market participants have the opportunity to try to gather liquidity into the market to find where there might be buyers to consolidate that interest in buying those securities when they reopen the stock in a much more orderly way. It is really about giving the markets a time out, human beings an opportunity to turn off the algorithms, change the algorithms, do whatever is necessary with respect to all the automated trading programs and then to do what market makers and specialists have traditionally done, which is to build interest in the market.

Senator REED. And are you confident that the market makers, given that time in circumstances like that, can get it right without any assistance?

Ms. SCHAPIRO. You know, at the end of the day, the markets are going to find their natural level, and if the news is dire enough and drastic enough, the best we can hope for, then, I think, is just an orderly decline coming off of the new single-stock circuit breakers and the market-wide circuit breakers.

Senator REED. Chairman Gensler, and then I am going to recognize Senator Schumer.

Mr. GENSLER. I would associate myself with Chairman Schapiro. I think the market-wide circuit breakers, it is called inter-market circuit breakers that were set up after the 1987 events, which have been triggered once, we are going to take a close look. We are going to use this advisory panel to look at. But as Chairman Schapiro has said, market participants will then have time, whether it is 30 minutes, or if it was a severe drop right now, the markets are closed for the rest of the day, it is overnight, for information to come into the market, for humans to be there.

A lot of these algorithms, just because it is algorithm, don't think smart. A lot of the algorithms are very just rote, even dumb. I mean, they just do what they have been programmed to do repeatedly. And so giving the 30-minute pause in the inter-market circuit

breaker or even overnight if it is a 30 percent decline, for instance, today gives humans a chance and information to come in. If it is overnight, it even gives the whole Fourth Estate, the news media, to comment. So there is a lot, a flood of information. But I agree, ultimately, markets will find their way.

Senator REED. Well, unfortunately, I think when it comes to the media, the headlines will be, "Markets Crash, Close, May Not Open," which might be a self-fulfilling prophecy, an unfortunate one.

But anyway, Senator Schumer?

Senator SCHUMER. Thank you, Mr. Chairman. Thank you for holding this hearing. I thank our witnesses.

We are in a brave new world here. It reminds me a little of that movie "2001," where they started out man and machines, and the machines took over and you missed something bad happened when machines just took over, and that is what we sort of have here. Everything is now so mechanized with very little human interaction that much of the time it works very well, and some of the time it doesn't work well at all, as we saw, and I worry about it.

I worry that we let the technology get too far ahead of us, and I am hopeful that the solution you posed solves it, but I have a feeling we are going to have other kinds of problems because everything is so new and everything is so quick and there is, as you say, these machines are very smart and very dumb. OK.

It is good to see both of you here together, the two agencies cooperating, but I do think there is a problem there, too. This started in the futures markets with one of these indexed, one of these indexed things, and we have the circuit breakers imposed in the equities markets but not in the futures markets. What kind of coordination is there, because I think most people agree that what started in futures spread to equities? What are you doing to deal with that kind of synapse, because the indexes can cause problems in individual equities and then we jump from the CFTC to the SEC?

Mr. GENSLER. Senator, we do have these inter-market circuit breakers that were set up in the 1980s. We are committed to take a look at those, take a look at the outside advisers, see whether the levels should be adjusted. So right now if it is a 10-percent decline for a certain time, 2 and 2:30—it changes. But then the cross-market stops. The index futures products close, the equity markets close, the index options close—everything closes for the 30 minutes or hour, depending upon the time of the day. We are going to take a look at that very closely.

Senator SCHUMER. Do you think that—what happened this time?

Mr. GENSLER. What happened this time——

Senator SCHUMER. The circuit breaker did not stop things from crossing from the futures——

Mr. GENSLER. It was not triggered because the market had not gone down 10 percent.

Senator SCHUMER. I see.

Mr. GENSLER. The question is whether——

Senator SCHUMER. Got it.

Mr. GENSLER. That is really what it is.

Senator SCHUMER. So you have got to look at this and re-examine it.

Mr. GENSLER. Look and re-examine whether to change those levels.

Senator SCHUMER. Right. The next question relates—it is a little along the lines of my opening remarks—to dark pools. SEC, NASDAQ, we have registered market makers. We have a little bit of that human element. You go to the dark pools and you do not. And I am worried that this is a potential area for problems because by nature they are dark.

Now, obviously, they give an advantage. Somebody wants to hide what they are doing—"hide" not in a pejorative way, but not reveal to the market that they are making a large, large purchase. I understand that. But it also may create problems that we do not know about.

Does what has happened in the last couple of weeks make you folks feels we ought to re-examine what is happening in dark pools as well?

Ms. SCHAPIRO. Absolutely, and as you know, we have proposed requiring that dark pools make their orders available for the public so that we do not end up with——

Senator SCHUMER. But when?

Ms. SCHAPIRO. When will we——

Senator SCHUMER. No, no. When do they have to make their orders available to the public?

Ms. SCHAPIRO. Oh, our proposal would have them display quotations broadly, not just to a select group of market participants as they do now when they receive the order. So the goal is to not allow this two-tier market to continue to develop where select market participants get access to quotes that the general public does not have access to.

So our proposal would basically define these indications of interest as bids and offers and require public display, except for very, very large blocs where there may be some legitimate interest in——

Senator SCHUMER. The dark pools would become a little less dark.

Ms. SCHAPIRO. Exactly right.

Senator SCHUMER. Well, I think that is probably needed. Me, I am for openness and sunlight, first and foremost. I worry when we do not have it. I worry when we do not have it.

My final question relates a little bit to what Senator Bunning talked about, but I would just like to follow up. Some markets are canceling trades that were executed after stocks dropped 60 percent. But there are a lot of investors who sold when their stocks were down 20 or 30 percent, and they lost thousands of dollars, even though the stocks closed right back where they started.

What is the SEC doing to help these investors get their money back, if anything?

Ms. SCHAPIRO. On a going-forward basis—and I recognize we have to deal with the 20,000 or so broken trades that were done arising out of May 6th. And with respect to those, we are looking very carefully at whether broker-dealers who handled particularly a lot of retail order flow during that period gave best execution to their customers, if they were executed 40 or 50 or 60 percent away from the market. And we will continue that investigation very

quickly. There are clearly going to be aggrieved customers given the level at which the exchanges set the break threshold.

Going forward, we have to fix this process. It is badly broken.

Senator SCHUMER. Can I ask one final question, Mr. Chairman?

Senator REED. Yes, you may.

Senator SCHUMER. Thank you.

One final question to both of you. In general, do you think that in this area the rules that apply to equities and options should apply to futures, it should be the same kinds of uniform rules across the board in general? And I would like each of you to answer that.

Ms. SCHAPIRO. We need to get uniform rules—my first order of priority is uniform rules within the equity trading venues, which we do not have right now. And so we are very focused on that.

We have a Joint Advisory Committee that we have convened and it will meet on Monday, and one of their tasks will be to look at where between the two marketplaces, equities and futures, we have disparate rules that might be contributing to market volatility or the transmission of volatility from one market to the other. And we would expect to use those market experts to help us figure out exactly what ought to be the same.

Clearly, for things like circuit breakers, they have to operate across the market seamlessly. Those must be the same.

Mr. GENSLER. I would say critically market pauses, circuit breakers have to operate the same. There is something called a single stop futures market. It is not traded much but, for instance, that has to link into the same single stock, the broad market. Whether it is an S&P future, an S&P option, wherever, it has got to be at the same time. There are also risk management standards that happen in the futures markets, which, frankly, are a little easier to do in the futures market because there is not 50 or 70 venues. It is not that one is better or worse. It has just been easier to do.

Senator SCHUMER. Thank you, Mr. Chairman.

Senator REED. Thank you.

Senator Bunning.

Senator BUNNING. I brought this up earlier, but I want to get a little clarification of it. I am troubled by the way exchange-traded funds and closed-end funds move differently than the stocks they are actually supposed to track. As you can imagine, if those funds do not accurately reflect the value of the underlying stocks, there will be serious consequences as investors lose faith in them.

What have you found out about what happened to them?

Ms. SCHAPIRO. It is a great question that is a huge area of focus for us. If you look at the canceled trades, 70 percent of the issuers who had canceled trades were exchange-traded funds. So we have much more work to do in this regard, but here is what we are looking at.

For example, NYSE Arca is the primary listing exchange for almost all exchange-traded funds. So we want to know did the loss of access to Arca's liquidity pool, when two other exchanges routed around them to trade, disproportionately impact the liquidity and the trading of the exchange-traded funds. We want to understand why it was that the severe ETF price declines generally occurred after single stock price declines and how that linkage works.

Did the inability of market makers, for example, to hedge their ETF positions during the volatility contribute to a lack of liquidity? Were there more stop loss orders that were entered in the ETF markets than with respect to individual stocks? Was that a contributing factor? And did institutional investors short the ETF to hedge their broader market exposure as the market was declining?

And so those are the areas we are looking at very carefully. ETFs are a huge part of our marketplace now. There are over 800 of them. They have over $700 billion in assets. Real people were impacted when the ETFs were impacted, and we are going to continue to look at this area particularly closely.

Senator BUNNING. OK. I happened to be watching the market very closely when this was going on, and I watched a stock called Procter & Gamble at $61 a share and then the next trade was at $37 and the next trade was at $39. Now, those do not come within those parameters that you set out. In other words, the stock drop was not significant enough to be included.

Ms. SCHAPIRO. My understanding is that Procter & Gamble declined 36 percent in 3 ½ minutes, so the proposed circuit breakers of a 10-percent drop within a 5-minute period——

Senator BUNNING. Yes, your proposed.

Ms. SCHAPIRO. Right.

Senator BUNNING. I am talking about current.

Ms. SCHAPIRO. No, that is right. Procter & Gamble also recovered back to that $60 in about——

Senator BUNNING. Yes, they did. I was just going to say it wound up at 60-something that day, and what happened to the poor person who sold at $37.

Ms. SCHAPIRO. That is right. They do not fall within the 60 percent away from the last valid price threshold, I agree, which is, again, why we——

Senator BUNNING. Where is the market maker in Procter & Gamble? Where was the liquidity in the market maker?

Ms. SCHAPIRO. That would be a great question for the next panel of exchanges.

Senator BUNNING. Oh, OK. I will wait to ask that of the next panel.

When you update the circuit breakers for stock indexes, do you expect to harmonize the rules between equities and futures in the same index?

Ms. SCHAPIRO. Absolutely. One of the things we are looking at as we think about updating the market-wide indices is whether we should move, for example, from the Dow to the S&P. Are the thresholds right? Are the trading halt periods——

Senator BUNNING. We have a day going today that you may get another chance at this.

Ms. SCHAPIRO. Great.

Senator BUNNING. I just want you to know, today.

Ms. SCHAPIRO. Clearly, these have to be highly coordinated across these two markets, and not just one.

Senator BUNNING. Well, I just am worried that by lack of not getting something done we could have a repeat. We are off almost 300 points on the Dow right now. The S&P is right at 30, and off. And the NASDAQ—or the other stock exchange is right around 60.

Now, if we get bad news out of the IMF or Greece or Portugal or something that would have an adverse effect on our own markets, we could see the exact same reoccurrence, and we have not done anything.

Ms. SCHAPIRO. I share your sense of urgency, and we are moving very quickly, quicker than I have seen the SEC move in a very long time.

Senator BUNNING. I know that, but that is not quick enough.

Ms. SCHAPIRO. I understand. It is not quick enough. The existing circuit breakers we have will just have to be our fallback until we can get it done.

Senator BUNNING. I think there comes a time when you take emergency actions, and if we are in that situation and in a market situation where we need emergency powers, all you have to do is come here and ask, because we do not want a reoccurrence, and we surely do not want to arbitrarily break up trades that were legitimately done under a set of rules. And I would urge you to come and directly ask this Committee for emergency powers.

Senator REED. Senator Schumer.

Senator WARNER. I have just got one more question.

Senator REED. Senator Warner.

Senator WARNER. I think you are all hearing our concern. But my only other question is—it is not going to be very articulately asked, but we are trying to get in place rules for circuit breakers. We are trying to get in place rules if we have this precipitous fall on how we make good or break up trades that are a result of this, again, as Senator Schumer said, "technology run amok." You know, but I think there is also a bigger problem about market trust here. I thought I spent the last year and a half on this Committee trying to get up to speed on how we maybe put in place rules to fix the last crisis. But my gut just says that we may be looking at the beginnings of what could be the next crisis. I mean, terms that I am not sure—just probably not many folks a decade ago really understood the first time folks talked about credit default swaps or naked credit default swaps; the new terms of art of "high-frequency trading" or "flash trading," which you have already taken action on; collocation, sponsored access, dark pools, you know, "sniping" and "sniffing."

You have said we are 2 weeks into this and you have not figured out—and, again, I am not being critical here, we have not figured out what caused the last problem. How do we make sure we have not only got rules in place to prevent or ameliorate the next technology run amok? I just in my gut feel like these firms who are making hundreds of millions of dollars of investments to get this technology advantage are not doing it simply to add liquidity to the marketplace. They are not doing it simply as a sign of good corporate citizenship. They are doing it to get a competitive advantage, and who are they getting a competitive advantage over? They are getting a competitive advantage over the Jim Bunnings who used to trade or the Mark Warners that used to trade or, you know, the guy in Schenectady who is trying to see—panicking when the market is dropping and trying to take action because he is not competing on a level playing field.

So my appeal is if you need not only action in terms of making sure we have got the circuit breakers in place, but how do we also make sure you have got the technology and the tools in place to make sure that we can give confidence to that investor in Virginia Beach who contacted me on May 7th saying, "What do I tell my investors who lost a lot of money on trades they made yesterday?" Because it was not market reactions, but there was something else going on.

Ms. SCHAPIRO. The technology and tools are absolutely critical for us to be able to understand exactly what went wrong here. That will inform obviously the kinds of fixes and things we would put in place, because we do not have all those answers yet, though we do not want to wait to try to ameliorate the impact of what happened. Whatever "it" was—mismatch of liquidity, what happened in Greece, whatever the causes were—linkages between the two markets. That is why we have moved so quickly on things like circuit breakers, are moving quickly on things we think exacerbated the volatility, the use of stop loss orders, the use of market orders, and all of these things.

So we are jumping on the things we can fix immediately to try to fix those immediately. We are doing this longer and deeper dive, which I hear you all saying pick up the pace on and figure out what is really broken in our market structure and get those things fixed as quickly as you can. And that is really what we are trying to do.

Senator WARNER. I guess my time is up, but the question I am also asking is: As we sort through how we try to prevent this, we also have got to sort through to make sure that everybody is operating on a level playing field.

Ms. SCHAPIRO. There is no question about that, and so much of what we are trying—I believe the markets exist for public companies to raise capital, to build businesses, and create jobs, and they exist for investors to support that activity. And those are the number one and number two purposes of markets. And everything else from my perspective has to be put into the context of those two goals.

Mr. GENSLER. I would agree with what Chair Schapiro said, that in this new world of technology, we are not going to stop technology, but we have to make sure that markets are fair and orderly, transparent, as Senator Schumer said, they are not just mechanized creatures, again, as Senator Schumer said, but that they work for investors, they work for corporations that want to hedge their risk or raise capital, and that the pricing in those markets really reflects what buyers and sellers are coming together to reflect—you know, the risk and the values of the underlying companies.

Senator REED. Senator Schumer.

Senator SCHUMER. Thank you, Mr. Chairman. I want to follow up a little bit more specifically on Senator Warner's fine questioning here.

You know, we have competition among various exchanges, too, and some of them gain an advantage by being less regulated, if you will. And I am not so sure that is good or fair. So Direct Edge and BATS, for instance, they do not have to have registered market

makers, nor do they have to have a consolidated audit trail, so it is hard to find out what happened even after the fact to correct them. Why should they be allowed—why should other exchanges like a NASDAQ or an NYSE have these regulations—which they should for the good of the markets, but we have other so-called exchanges which do not, even though it seems both those two having registered market makers, having a consolidated audit trail, why shouldn't they have those? And why are we letting them do this and they are capturing a big share of the market? I am not so sure it is because of technology as much as it is because they have less regulation.

Ms. SCHAPIRO. I think over the last several years, over the last decade, as the national market system grew and fragmented and splintered and there was a view that we have to encourage lots of innovation and lots of competition, and that would be good for our traditional markets, NASDAQ and the New York Stock Exchange in particular.

We lost sight of the fact that we also have to ensure that there are obligations on these other trading venues, that there is transparency, that there is investor-first focus. And I am highly focused on that.

We will have, I believe, a consolidated audit trail. I believe the Commission will approve going forward with that next week. And that will——

Senator SCHUMER. You mean for BATS and——

Ms. SCHAPIRO. That will require all of the data, yes, from all of the trading venues.

Senator SCHUMER. Right. And what about the idea of registered market makers? No one is saying if someone does not have a faster, better technology that they should not implement it. No one should have a monopoly. But if they are gaining share not because they have a better technology but because they have fewer obligations to protect investors, we have got big trouble. And I am worried that with these new—Direct Edge, BATS, that is just what we have.

Ms. SCHAPIRO. I understand that, that the self-regulatory obligations do not exist on all of those markets or those trading venues the way they exist on our exchanges, and we have to look at that very carefully.

Senator SCHUMER. Well, are you going to put some in? Are you looking to equalize it?

Ms. SCHAPIRO. It is clearly part of what we are looking at in our view of market structure.

Senator SCHUMER. OK. Well, I am going to be watching really closely and carefully about that because, again, I do not see—let me ask you this question since I have another minute. Is there any justification why these two exchanges shouldn't have a consolidated audit trail? Is there any?

Ms. SCHAPIRO. I cannot speak to what has happened historically. My view is no. The SEC has got to have access to consolidated audit information and order tracking information across all of the trading venues.

Senator SCHUMER. OK. And the second one, a little harder, but, still, any justification why they shouldn't have registered market makers?

Ms. SCHAPIRO. I do not know the answer to that. I guess I would like to come back to you on that. It depends upon the obligations, I think, with respect to the market makers.

Senator SCHUMER. Mr. Chairman, could I ask unanimous consent that the SEC Chair, who I have tremendous respect for, have 5 days to submit an answer to that question in writing for the record?

Senator REED. Is that——

Ms. SCHAPIRO. Absolutely.

Senator SCHUMER. Thank you.

Thank you, Mr. Chairman. Thank you, my colleagues.

Senator REED. Thank you, Senator Schumer.

This has been very useful questioning, and I want to push it a bit further. One of the critical events, this confluence of events, which we agree was somehow the course, was unusual trading of a futures contract regulated by the CFTC. But from Senator Bunning's remarks, this affected a stock like Procter & Gamble, which is clearly an exchange-traded, SEC-regulated entity. And it begs the question, I think, other than informal cooperation as you are exhibiting now, don't we need some more regular, systematic, not only review of the rules but consistent rules that are derived by joint rulemaking? That was the essence of the Dodd bill.

Chairman Schapiro, what is your view on that?

Ms. SCHAPIRO. I do think we have the opportunity to bring much more consistency to these markets that are frequently economic substitutes for each other, and that is one reason we created a Joint Advisory Committee to help the two agencies understand exactly where we could benefit most from having similar or the same rules. And, clearly, under whatever version of legislation passes, we will have a fair amount of joint rulemaking to undertake with respect to securities-based swaps.

Senator REED. Well, the present legislation before us specifically excludes most joint rulemaking, so can I assume you would maybe not prefer but for the greater good would anticipate or support more joint rulemaking?

Ms. SCHAPIRO. Joint rulemaking has its own challenges, as we know, when we have to get ten people to vote and consider and get a majority to pass. So whether it is joint rulemaking or parallel rulemaking, we need consistency in the regulatory regimes that govern these economically equivalent instruments. So whether it is identical rules—ideally it would be one regulator. But whether it is identical rules or joint rulemaking, we cannot allow there to be differences that will be arbitraged and gaps where problematic conduct could be hiding.

Senator REED. Well, given the institutional arrangements that are likely to stay in place and given the fact that in the future there might not be the same kind of meeting of minds and cooperative spirit that you both exhibit, there has to be, I think, an institutional structure that guarantees that this will happen.

Ms. SCHAPIRO. I agree with that.

Senator REED. Chairman Gensler?

Mr. GENSLER. I think that through the financial reform package, it appears Congress will add some of that. I mean, there is joint rulemaking in the over-the-counter derivatives markets and products like mixed swaps and so forth where there are attributes of both. There is heavy consultation, I believe, if I remember the last drafts of this, that each agency must consult and so forth. We also on our own have set up memorandums of understanding, and I think that if the financial reform package went there, we should embark to update that to include all of the new authorities, because I agree with the Senator that the cooperative relationship that we have now—we will be out of these jobs at some point. There will be other people and so forth. And the nature of two agencies is not always to agree.

Senator REED. Well, I think we were all sort of—and I think Senator Corker was not only being his usual insightful and charming self, but the reality is had we started in this all fresh, there would be one agency dealing with these products that virtually can be substituted easily one for another. That is not going to happen.

Senator WARNER. Since we did such a good job on prudential consolidation.

Senator REED. Right. But I think this notion that we are going to let it the good will of the regulators does not work.

Ms. SCHAPIRO. No.

Senator REED. Unless we have an institutional structure that does not cause excessive delay, that there is an action-forcing device, that it requires not just discussions but actually joint action, this situation will still be existing long after we have all left the scene.

Ms. SCHAPIRO. I agree with that.

Mr. GENSLER. We had even asked, jointly we asked for Congress to include on product review a new feature that—I think it is 120, but it may be 180 days—that if the two agencies cannot approve a product and know which way it goes, that we put in a judicial review feature.

Senator REED. I think that is very sound because I think we will anticipate for good reasons and sincere reasons there could be different perspectives, and there has to be an action-forcing device. But if we allow this whole enterprise to be based upon the cooperative and collaborative model you have shown, things change, people change, and we would be, I think, very foolish.

There is another aspect of this, too, that I think we have to at least recognize for the record, and you might want to comment about it. This was an accidental, unfortunate confluence of circumstances, but we all recognize that it could be a very deliberate attempt to disrupt trading, either through a physical attack on exchanges or through a cyber attack on exchanges.

Are you prepared to deal with that?

Ms. SCHAPIRO. Our staff spends a fair amount of time working with the exchanges and major market participants on business continuity planning and back-up and contingency planning for those kinds of events. We have requirements for back-up facilities and annually review the adequacy of those with the markets that we regulate.

Senator REED. Are you and your staff concerned that this is a real possibility, that this is not just a theoretical——

Ms. SCHAPIRO. You know, in this world, I have no evidence or reason to believe something is imminent or could or will happen, but I think we absolutely have to be prepared for that possibility. To the extent that we suffer from this very dispersed and fragmented equities market structure, the one good thing is we have multiple trading venues where, if we had a physical attack on one major institution, we actually can pick up the slack in other places. So that is maybe the silver lining of our structure. But we absolutely have to be prepared for that possibility.

Senator REED. Are you comfortable that the present legislation pending in the Senate would prevent any assistance to these entities, exchanges, and clearing platforms if they were subject to such a physical or cyber attack?

Ms. SCHAPIRO. I believe so.

Senator REED. So you are comfortable that in a situation where trading has been disrupted deliberately, the market itself can correct without any assistance from——

Ms. SCHAPIRO. No. I am sorry. I misunderstood your question. No, I think if there were a major disruption like that, there clearly would be some need for—or there likely would be some need for the Federal Government's support in some way. I do not know if it is financial support or logistical support or other kinds of support.

Senator REED. And you are aware that the pending legislation would prohibit that support?

Ms. SCHAPIRO. I am.

Senator REED. Thank you.

Chairman Gensler, your comments on these questions?

Mr. GENSLER. A series of comments.

On disaster recovery and so forth, we have been working with the exchanges. We actually on our own are probably going to put out a proposed rule later in this year on strengthening some of the back-up recovery and disaster recovery in terms of cyber attacks, as you mentioned, and so forth.

There are a series—and the futures markets maybe were benefited because there are fewer futures markets, but in this regard, that there is risk management standards, any contract, any transaction that comes in, has to meet the risk management standards of the clearinghouse, and because of that there is a series of filters and risk management standards before they come in. That does not mean that somebody could not possibly, as you say in a theoretical case, come in, but there is a lot of risk management practices. We are going to be looking to see if there should be more.

I think on the third question that you ask about, Federal assistance, I am aware that there is sort of—if I might, there is a little bit of—there is in Title 8 of the pending statute allowing for Federal assistance and in Title 7 there is not. So there is an inconsistency there.

I think that from my perspective the Federal Reserve that has had 13(3) authority to come in in an emergency if a situation should continue to be allowed, the 13(3) emergency authority, but not necessarily have daily access to the discount window. I know

it might sound like it is slicing this, but I think the emergency authority is probably still important.

Ms. SCHAPIRO. Mr. Chairman, if I could just clarify.

Senator REED. Sure.

Ms. SCHAPIRO. Because I do not think I was very clear. I think that—I would agree with a policy of providing the Federal Reserve Board the flexibility to provide immediate liquidity if it is needed in a rare or an emergency circumstance. And we have long, I have long supported ensuring that the systemic risk regime would have a second set of eyes in addition to those of the primary functional regulators and comfortable with that role at the Federal Reserve as well.

Senator REED. This is an important point, and I think we should be clear about it. As Chairman Gensler points out, there appears to be contradictory language in the bills, which we will resolve, I hope. But Section 7 specifically excludes the ability of the Federal Reserve to use its modified emergency powers to assist—or change clearing platform in a general way, not one but in a general way. And your view would be that that power, the 13(3) power, should be preserved.

Mr. GENSLER. I believe it is Section 716, the vaunted 716 that has other issues. But 716, I would retain the part of 716 that limits the daily access of the discount window but allow in an emergency circumstance for the Federal Reserve to lend to participants in generalized liquidity programs. They would have to put out a rule so people would know what it is, but then the participants would be able to have that emergency action.

Senator REED. Thank you very much.

A final question, which this, again, has been swirling about us, and I think you should be asked, too. There are several proposals that would essentially ban over-the-counter swaps, in some cases make them illegal. Is that from your standpoint, Chairman Gensler, a good policy to pursue?

Mr. GENSLER. I think that derivatives, whether they be on exchanges or what we call over-the-counter, are important risk management tools for municipalities, corporations, and ultimately their customers and employees. I am not familiar with the pending amendment, but a lot has gone on in the last 24 hours to, quote, ban risk management tools of corporations. If they are customized, if they are tailored, we still think there should be comprehensive regulation of the dealers. I am pleased to see that in the Senate substitute there is truly a comprehensive regime. It is standard enough to be on a clearinghouse and clearable. And if it is then listable, then there is the clearing requirement and, in certain circumstances, a listing requirement. That, I think, is a strong package that you and others have put together.

Senator REED. Chairman Schapiro, any final comments?

Ms. SCHAPIRO. Just a brief thought. I assume this is Senator Cantwell's amendment potentially, the——

Senator REED. Well, there are several.

Ms. SCHAPIRO. There are several, OK.

Senator REED. There is a sizable number of colleagues who are thinking about this. This is a question I think should be addressed both you and Chairman Gensler.

Ms. SCHAPIRO. You know, I think the key policy question is whether that would provide—or create legal uncertainty for swaps that are accidentally not cleared or whether it creates the opportunity to game the system. I actually think those concerns can be addressed, but I would note that we already have under the Federal securities laws, under the Exchange Act Section 29(b), a similar although not identical provision, although it has not been applied ever in the context of requiring something to be cleared or not. So it might move the Commodity Exchange Act regime more in the direction of the Federal securities laws; but, on the other hand, it may have the potential to create legal uncertainty

Senator REED. Chairman Gensler, your final point.

Mr. GENSLER. Well, if it was a question about—there is one issue—I did not understand your earlier question to cover this, but if it did, if an over-the-counter derivative is deemed to be clearable and the regulators through a public comment period have determined that it must be cleared, which is what is in the substitute, in that circumstance there is a mandate that it must be cleared. If somebody knowingly does not follow that, what happens? And I believe the substitute right now gives the SEC and CFTC a lot of authority, but to be clarified to say that that transaction is unlawful seems consistent with actually what the intent is, that it is a mandate once you have this public comment period and it is a mandate, it is a real mandate.

Senator REED. I think part of this—and I will not get into the details here—is that some reading of these proposals would suggest that they go beyond that, saying that, in fact, you have—even as an exempt end user—an over-the-counter derivative that you present to a clearing platform and they will not clear it, then if you enter that contract, then that is illegal. But I think we have provided at least some insight into the proposals, and I thank you for that.

I will invite my colleagues for further questions——

Ms. SCHAPIRO. Senator Reed, may I just clarify the record on one thing I said in response to Senator Schumer? BATS is actually an SRO, as is Direct Edge. He specifically mentioned those two marketplaces, although Direct Edge is not yet operating as such. And the decision about whether to have designated or registered market makers has been an exchange-by-exchange decision, but it is something we will be happy to look at.

Thank you.

Senator REED. Thank you very much, not only for your testimony today but for your very vigorous and thoughtful and demanding service to the Nation. Thank you.

Mr. GENSLER. Thank you, Mr. Chairman, Senator Bunning, Senator Warner.

Senator REED. Let me call up the second panel please.

Thank you all, gentlemen, for being here today.

Let me introduce our witnesses. Our first witness is Mr. Richard G. Ketchum. He is the Chairman and CEO of the Financial Industry Regulatory Authority, or FINRA, the largest non-governmental regulator for all securities firms doing business with the U.S. public. Prior to becoming CEO of FINRA, Mr. Ketchum served as CEO of the New York Stock Exchange Regulation and Chief Regulatory

Officer of the New York Stock Exchange and has also worked for Citigroup, NASD, NASDAQ, and the SEC.

Our next witness is Mr. Larry Leibowitz, the Chief Operating Officer of NYSE Euronext. He joined Euronext in 2007 after serving as the Managing Director and Chief Operating Officer at UBS Investment Bank and has also worked for Schwab Capital Markets.

Our third witness is Mr. Eric Noll, the Executive Vice President of Transaction Services for the NASDAQ OMX Group. Mr. Noll joined NASDAQ from Susquehanna International Group and has also held positions at the former Philadelphia Stock Exchange and the Chicago Board's Options Exchange.

Our finally witness is Mr. Terry Duffy, the Executive Chairman of the CME Group. Mr. Duffy has also served as Chairman of the Board of CME and CME Holdings and was President of TDA Trading from 1981 to 2002.

All of your statements will be made part of the record. If you would like to summarize them, we would like it, too.

Mr. Ketchum, please.

STATEMENT OF RICHARD G. KETCHUM, CHAIRMAN AND CHIEF EXECUTIVE OFFICER, FINANCIAL INDUSTRY REGULATORY AUTHORITY

Mr. KETCHUM. Chairman Reed, Ranking Member Bunning, and members of the Subcommittee, thank you again for inviting me today, and I commend you, Mr. Chairman, for having today's hearing and I thank you for the opportunity to testify.

I would also like to commend Chairman Schapiro and Chairman Gensler, whom you have just spent a good deal of time talking with, for their leadership during the last 2 weeks and in coordinating the review of all relevant market data and efforts to identify measures that could be taken quickly to significantly reduce the chances of a recurrence of the significant market disruption that occurred on May 6.

Immediately after the market events on May 6, FINRA, in coordination with the SEC and other market SROs, began the process of trying to identify unusual activity that could have contributed to the rapid market drop. Even before the market data had been fully collected, FINRA reviewed clearly erroneous trade filings and, along with NYSE Regulation, interviewed the approximately 20 firms with significant activity during the period of the decline to determine whether "fat finger" or other trading errors occurred. None of the firms identified any trading errors or other unusual activity, nor has any evidence been developed to indicate that a single large trade or basket of trades entered in error played a role in the market decline.

We also contacted over 250 firms to determine the impact of the market disruption to the firms and their customers. Our inquiries covered a range of issues depending on the type of firm, including funding and liquidity, customer exposure, increased margin calls, net capital implications, and how firms intended to reestablish limit orders that were executed and canceled. While a number of operational and other issues were identified, none of them appeared to be systemic in nature.

We have focused our review of the vast amounts of trading data on the approximately 300 stocks that experienced the most traumatic decline and have identified a subset of these stocks for further inquiry based on an analysis of the concentration of order and trade activity in the period immediately prior to and during the market drop. Focusing on the selling activity in these securities, we, along with our fellow regulators, have made inquiries of those firms that were most active. Our lines of inquiry include an analysis of short selling during the period and the role that algorithms played, including the specific strategies and triggers employed by each of the trading firms.

While there is still much to be done before we can say that we have definitively pinpointed the cause or causes of the decline, I think we can say that certain basic truths have emerged and that we should not wait to adapt to them. We know that the process for restoring order following an event like last Thursday should be more transparent and predictable. Also, because trading in equities is dispersed among many venues, market quality can only be ensured through coordinated activities across all markets.

In short, while our equity market structure performs well under normal conditions, change is urgently needed to address these flash market break situations. That is why the coordinated rule filings the SEC spearheaded are so important. I won't spend more time discussing the details of them since they were covered in detail at the last panel.

As we look past these shorter-term steps to address what we saw in the market 2 weeks ago, longer-term concerns must also be addressed if we are able to reassure market participants that our equity markets are stable and fair. This is true irrespective of whether those issues played a major contributing role in the specifics of the decline on May 6.

First, firms need to ensure that they do not continuously feed orders into the markets once markets have broken with respect to precipitous declines or employ market orders in these volatile periods.

Second, firms must properly supervise customers to whom they have given direct access to their markets.

Third, there should be a continued analysis of various market rules regarding circuit breakers and clearly erroneous trades with an eye toward consistency and transparency of these rules across markets.

In addition, we should examine various order types, such as market and stop loss orders, and their impact on the events of May 6. We should also analyze and potentially eliminate the practice of stub quoting.

Finally, the events of May 6 demonstrate the vital importance of the SEC's current review of market structure and forthcoming proposal relating to establishing a consolidated audit trail.

The sometimes dizzying speed of change in the markets, which puts a premium on innovation and competition, has made it imperative that regulators act now to address the lag between market innovation and regulation. This is particularly important in the increasingly fragmented area of equity trading, where we have seen a rapid evolution of how and where trading occurs and how quickly

and transparently it is executed. Today, orders are routed to some 50 competing platforms. This complex environment creates opportunities for traders seeking unfair advantage to manipulate markets by exploiting inconsistencies or gaps created when the responsibility of regulatory oversight is divided.

Regulatory authorities are hampered by the lack of a comprehensive and sufficiently granular consolidated audit trail. Indeed, the frustration that many of you have expressed today with respect to the time it takes us to recreate what really occurred on May 6 is absolutely reflected by the fact that our audit trail today simply does not identify each of the entities that significantly impact pricing, but instead focuses on the executing broker-dealer and those who clear the trades.

The most effective way to surveil across the wide range of market centers is to consolidate audit trail data in a single place so that violative trading practices can be more readily identified. While a consolidated audit trail would not eliminate all the challenges of analyzing the data from a 66 million-trade day, like May 6, it would make the process significantly more efficient and effective. More importantly, it would enhance oversight of the equity markets, ensuring market integrity and protection of investors.

We look forward to working with the SEC and this Committee on these important initiatives that lie at the heart of enhancing regulators' ability to best oversee today's markets, and I look forward to answering your questions going forward.

Senator REED. Thank you very much.

Mr. Leibowitz?

STATEMENT OF LARRY LEIBOWITZ, CHIEF OPERATING OFFICER, NYSE EURONEXT

Mr. LEIBOWITZ. Chairman Reed, Ranking Member Bunning, and members of the Subcommittee, thank you for the opportunity to be here today.

We commend the Subcommittee for your proactive response to the events of May 6. If ever we needed one, the events of that day are a clarion call for the need to enhance investor and listed company safeguards. May 6 also confirms the wisdom of the SEC's ongoing efforts to improve the markets, including their broad market structural review and their leadership in bringing the markets together to develop the circuit breaker pilot.

Today, I would like to discuss three things. First, the high-level causes of the May 6 events. Second, clarifications about NYSE's market model and how it worked. Third, our recommendations going forward.

It is understandable that everyone is looking for a smoking gun behind the May 6 dip. However, the circumstances are more complicated than that. I will leave it to the regulators to link the interactions of various markets, but from our standpoint, we see no evidence of "fat finger" error or market manipulation due to automated trading or otherwise.

However, we do see the following: Elevated market activity coming from adverse and European news, including a huge and broadly based wave of orders and quotes at around 2:40 p.m. A significant thinning in the marketplace as liquidity deserted the market

through the day, accelerating into the downturn. Various microstructure issues which exacerbated the liquidity effect.

One of the things that we do note is that news and fear get transmitted to the market faster than ever before thanks to technology and media advances, and we need to ensure the integrity of the market during these periods.

Now, I would like to briefly turn to the NYSE market model and how our actions on May 6 reduced volatility to the benefit of investors and listed companies alike. NYSE has embraced electronic trading. We believe our market model provides the best combination of cutting-edge technology with human judgment. NYSE market rules expressly provide mechanisms to mitigate volatility and large price swings, which we have always believed is a critical piece of our offering to listed companies and their investors. In essence, at the NYSE, we have emphasized price over speed.

Specifically, the NYSE incorporates a type of circuit breaker mechanism known as liquidity replenishment point which temporarily and automatically pauses trading in stocks when significant price movement occurs. On a typical day, LRPs are triggered 100 to 200 times, lasting for seconds, at most. In fact, these are akin to the circuit breakers that the CME discussed recently, which is a brief pause to allow liquidity to reassemble.

Let me be clear, the LRP mechanism does not halt trading. When LRPs are in effect, our quote is visible to other market participants and new orders are continually accepted. During LRP mode, electronic markets may choose to ignore our quotes as permitted under Regulation NMS, although many participants choose to continue sending orders to NYSE. LRPs are analogous to taking the controls of a plane off autopilot during turbulence.

I will highlight a few specifics. First, on May 6 during the 2:40 to 3 period, market share on the NYSE was 5 percentage points higher than usual during that time of day and the participation rate of our designated market makers, which were formally called the specialists, and supplemental liquidity providers was equally strong. This is evidence that our liquidity providers did not walk away from the market as we actively traded during the downturn.

Furthermore, to demonstrate that LRPs protected orders in our market, stocks listed on other markets had price declines and erroneous executions far greater than NYSE-listed stocks.

Last, the overall marketplace needed to cancel approximately 15,000 executions after Thursday's decline. On NYSE, even though we handled the largest share of orders in the marketplace, we had to cancel zero trades. In fact, 85 percent of the trades that ultimately were canceled were securities that were not even listed on the New York Stock Exchange.

The bottom line is while there is always room to improve, LRPs actually worked reasonably well on May 6, and the response from issuers and investors has been uniformly positive. However, the mechanism is only truly effective if observed by other trading venues, and that is why we applaud Chairman Schapiro's leadership in helping create an industry-wide trading circuit breaker.

I also want to mention an area that we believe has been the topic of inaccurate information. On May 6, NASDAQ declared self-help on NYSE Arca at 2:40 p.m. We were and are still unable to deter-

mine why, as all our systems and communication links were functioning properly. BATS also declared self-help at 2:47, but that was because they were sending orders outside of Arca's price callers, and a quick call between the venues resolved the matter. We welcome the SEC's review of these events and hope they will more generally review the use of self-help by venues against each other.

Last, we need to examine the ripple effect of stock volatility in the ETF market and absolutely must make sure that these are included in circuit breaker considerations.

In terms of recommendations, I want to quickly make a few points. First, we are pleased with the recently announced adoption of market-wide stock-level circuit breakers. LRPs will continue to function, as we believe they provide a significant advantage to companies listed on our exchange. We will review the need for and functioning of LRPs once the market-wide circuit breakers are implemented.

Second, the current market-wide circuit breakers established long ago are based on market moves of 10, 20, and 30 percent. There has not been a move greater than 10 percent in a single day post-2000. We understand the SEC is reviewing these as to whether to broaden these indexes.

Third, we are working with the regulators and other exchanges to establish clearer rules for cancellation of trades, although circuit breakers will help mitigate this problem substantially. In fact, I would submit that the mere need to cancel trades is the sign of a market structure that does not function properly. Since 2008, hundreds of thousands of trades have been canceled from electronic exchanges with stocks such as Cisco Systems trading down to a penny during the fourth quarter of 2008. It is time we put a stop to this.

Fourth, brokers should review their order routing practices to ensure they are truly getting the best prices for their clients and also see whether allowing market orders and stop loss orders really service the investing public or whether there are things we can jointly do to educate and protect retail investors from being harmed by volatile markets. Similarly, institutional clients should review their brokers' routing practices to ensure that these serve their best interests.

Fifth, to facilitate a review of extraordinary trading events, there should be a consolidated audit trail that would allow regulators to review market-wide trade data. Ultimately, these and other important actions may be best achieved by consolidating market surveillance in one security self-regulator, probably FINRA, which would require an act of Congress.

In closing, we applaud the SEC and the CFTC for working together to develop a coordinated response to the events of May 6. NYSE Euronext is committed to working with these agencies and we strongly urge all parties to play an active and responsible role in helping our markets function in a way that gives investors confidence.

Thank you for the opportunity to appear, and I would be happy to answer any questions.

Senator REED. Thank you very much.

Mr. Noll, please.

STATEMENT OF ERIC NOLL, EXECUTIVE VICE PRESIDENT OF TRANSACTION SERVICES, THE NASDAQ OMX GROUP, INC.

Mr. NOLL. Good morning, Chairman Reed, Ranking Member Bunning, and Senator Warner. Before I begin my formal comments, I would like to convey my appreciation and respect for the actions of SEC Chairman Schapiro and CFTC Chairman Gensler during this important period of time. Their actions and those of their staff have been exemplary.

We have studied the events and have worked closely with the SEC and the other exchanges to identify opportunities to improve regulation and coordination to combat market instability. We support the SEC's and CFTC's actions in four areas: One, updating existing market-wide circuit breakers; two, establishing new stock-by-stock circuit breakers that include an element of velocity of price changes; three, improving the handling of trade breaks to maximize consistency and rationalize moral hazard; and finally, four, changing the use of quotes and specific order types that impacted trading on May 6.

The focus of these changes is consistency. While each individual exchange reports that its systems functioned according to design on May 6, the changes will improve the collective ability to handle unusual trading events in the future and help to restore investor confidence. Markets like consistency and predictability. They abhor uncertainty. Our markets are strong, despite the 17 minutes of trading that have garnered public attention.

Keep in mind that on May 6, the global markets were nervous, becoming increasingly volatile and operating during an unusually long upward price trend. This volatility was certainly tied to the crisis in Greece and Europe. While developing for months, the potential harm seemed to sink into U.S. markets the week prior to May 6. Rating agencies lowered the ratings of sovereign debt of Greece, Spain, and Portugal, roiling debt markets. The European Union was working to fashion bailouts, and violence escalated in Athens. The Euro was down 15 percent in the last 6 months, 7 percent in the prior 2 weeks alone.

Against this backdrop, we arrived at the afternoon of May 6. First, the Dow Jones Industrial Average was down 272 points for the day, down 500 the previous 3 days.

Second, there was an unusually large institutional order to sell futures tied to the S&P 500 Index on the CME. Futures are a forward indicator for prices of equities. Thus, when S&P futures sank rapidly at 2:42, this was followed by rapid declines in S&P-linked equities.

At 2:45 and 30 seconds, S&P futures became so negative the CME triggered a stop price logic event, a 5-second pause in trading to collect liquidity, effectively a market-wide halt in the futures market. When trading resumed, futures leveled off and began to climb. Shortly after, equity prices also rose. The CME assures that its systems functioned properly and there is no evidence of inappropriate activity by the CME or any of its members.

Third, the NYSE Arca Exchange, the electronic market operated by NYSE, began experiencing communication issues, at least with NASDAQ, that hindered electronic linkages with other markets. The other exchanges were forced to route around Arca. Again,

there is no evidence of inappropriate activity in Arca or any other problem, but its liquidity became less available to the entire market at a critical time.

Fourth, simultaneously with Arca, the NYSE hybrid market began reporting multiple liquidity replenishment points in gap quotes that impacted trading in the NYSE-listed stocks. Under SEC Regulation NMS, NYSE is permitted to issue LRPs, but this functioned as a signal to other markets that NYSE was experiencing order imbalances or difficulties. This, in turn, allowed other markets to stop routing orders to NYSE and to trade elsewhere, and that is exactly what happened. NASDAQ and other markets routed around NYSE as Reg NMS contemplated. Even Arca, NYSE's own electronic market, stopped routing orders to NYSE. NASDAQ's ongoing analysis indicates that May 6 was triggered by a confluence of unusual events, including events outside the equity markets. We continue to investigate, but we have not located any single smoking gun that caused or fully explains these events.

I would note also that so-called high-frequency traders appear to have played no distinguishing role in this event. They behaved in line with other liquidity providers and liquidity takers during that day. The SEC is engaged in an important review of market structure and the policies around high-frequency trading and we recommend that Congress allow that review to run its course before considering additional policy reactions in this area.

From a systems standpoint, NASDAQ's markets operated continuously throughout the day and throughout the critical 17 minutes. Each and every one of our systems functioned as designed and intended, our execution engine, market data feeds, and surveillance systems.

While each exchange is reporting that its systems functioned as designed, no market center or regulator can be satisfied with the collective performance of our markets on May 6. That is why NASDAQ supports and has filed with the Commission rules to implement cross-market single stock trading halts and supports the SEC's recommendation to update market-wide circuit breakers. NASDAQ also supports the Commission's decision to review practices that cause individual markets to pause or go slow to determine if any other practice starves the market of liquidity when it is most needed, including the operation of certain order types or the practice of market maker quotes.

Thank you again for the opportunity to share our views. I am happy to respond to any questions you may have.

Senator REED. Thank you.

Mr. Duffy, please.

STATEMENT OF TERRENCE A. DUFFY, EXECUTIVE CHAIRMAN, CME GROUP INC.

Mr. DUFFY. Chairman Reed, Ranking Member Bunning, thank you for inviting me to testify today.

CME Group has engaged in a detailed analysis regarding trading activity in our markets on Thursday, May 6, 2010. Our review indicates that our markets functioned properly. We have identified no trading activity that appeared to be erroneous or contributed to the break in the cash equity market during this period. Indeed, our

markets led the recovery. Moreover, no market participant in our markets reported that trades were executed in error, nor did CME Group exchanges cancel, bust, or reprice any transactions as a result of the activity on May 6.

Futures contracts by design provide an indication of the market's view of the value of the underlying stock index. That is why CME Group's E-mini S&P 500 is a leading indicator, not a cause, of a decline in the underlying primary market.

To illustrate this point, I would like to draw your attention to these two charts. Chart 1 shows that the E-mini S&P, which is the blue line, move virtually in tandem with the S&P 500 Index, which is the red line. You can see that at 13:46, the market had had time to attract liquidity and rebalance and the E-mini led the recovery, ultimately rallying 40 S&P points, or the equivalent of approximately 400 points of the Dow.

Chart 2 shows price movement in the E-mini S&P futures as well as 3M stock. As you can see, the price of 3M stock declined much more rapidly starting at 13:45, with the E-mini S&P 500 hitting the low at 13:45:50, at which time you see the market and the E-mini S&P reverse while the 3M stock continues to decline.

Market integrity is of the utmost importance at CME Group. We have developed systems that maintain integrity in all our markets, including a number of control to protect market users, such as stop price logic functionality, price banding, and circuit breakers. Stop price logic functionality serves to mitigate artificial market spikes that can occur because of the continuous triggering, election, and trading of stop orders due to insufficient liquidity.

On May 6, the stop price logic trigger, a 5-second pause in the E-mini S&P Equity Index, allowing the market to locate liquidity and to stabilize. We have seen no evidence that high frequency or other specific trading practices in any way magnified the decline on May 6. In fact, our market indicates that the high-frequency traders in our market provided liquidity on both sides of the market on this extraordinary day.

The CFTC and SEC issued a joint report Tuesday that reflects preliminary staff findings resulting from their ongoing reviews of the events of May 6. We commend both the Commissions on their swift response and look forward to working with them to identify constructive solutions.

In particular, we are pleased and concur with those recommendations seeking harmonization across the national market system. As the report suggests, circuit breakers, including circuit breakers for individual stocks, such as those implemented by the NYSE, must be harmonized across markets. Stop logic functionality should be adopted across markets to prevent cascading downward market movements as the report confirms it did on May 6 in the E-mini. Last, the current circuit breaker levels and the duration of the halt should be reevaluated and updated to current market conditions.

I thank the Committee for this opportunity and I look forward to answering any questions.

Senator REED. Well, thank you very much, gentlemen.

Listening today to the testimony, I think we all would be more relieved if it was the fault of "fat finger," who sounds suspiciously

like a character in a Mike Myers James Bond spoof, but that is not the case.

We are still left, I think, based on your testimony, with the conclusion that we are not quite sure what was the decisive precipitating course. There were several factors, and I will give you the chance to comment about that. But it strikes me, too, that one thing is clear. We have highly interrelated markets and we have different rules in those markets. Some of these rules, I presume, were crafted with the awareness of other rules, but perhaps not consciously and deliberately complemented or syncopated or whatever the word is, and that part of the effort here is to begin to harmonize rules and ask tough questions about whether that harmonization means to make them all the same, which could exacerbate a crisis or at least make them responsive to and reflective of the other rules.

So with that long, long sort of introduction, the basic first question is can you comment about sort of the status of what do we know and what don't we know about May 6 and also about the need for a much more coordinated structure of rules. Mr. Ketchum first, and we will go right down the line.

Mr. KETCHUM. Thank you, Chairman Reed, and I think your points are well made.

I would agree with a great deal of what Chairman Gensler said earlier. We do know a great deal about what happened on that day at this point. While we are cautious not to characterize everything without fully understanding all of the underlying activity of customers behind it, a few things seem pretty clear, and you categorized it fairly well.

This was not the result of one single program. It was the result of large numbers of programs that operate very similarly together. It was the result of real selling activity with respect to real things happening in the marketplace, but the response of the concentrated selling activity and the speed in which liquidity can disappear from the market is close to absolute. And that is combined with an environment now, as you discussed in earlier panels and discussed in the opening statements, where there aren't consistent market maker obligations across markets at this point, and without that, where there isn't an ability for participants to be able to pause and reinsert buying activity. That is simply unacceptable.

The first step, the pauses are important and they need to move beyond the S&P 500 once they are appropriately crafted to ETFs and other securities. That will allow for the ability for algorithms and people to understand and be able to reinsert buying activity. It is not that it will miraculously appear, but computers are designed when they don't understand something to withdraw. You need enough time to determine that the world actually hasn't ended and that there are reasons to continue to buy stocks.

That needs to be combined with consistency across each market and stocks and futures. You are right. These are not always identical things, but with respect to areas like pauses and circuit breakers, they should be absolutely consistent.

Senator REED. Mr. Leibowitz, any comments in this whole——

Mr. LEIBOWITZ. Sure. While I think it is very comforting, it would be comforting to know what the triggering cause of this was,

I think it is largely irrelevant. It is like airport security. We all take our shoes off because someone happened to put a bomb in his shoes, and we all wondered what would happen if somebody put it in their pants, and they did.

I think what we need to do is take the step back and say, what are the factors in our market in terms of the order types that retail traders use, stop losses, things like that? What do we do about liquidity obligations, how fast the markets react to news now, and can liquidity get there in time, because we have talked about liquidity thinning. It actually thinned on the sell side, as well. It didn't just disappear from the buy side.

And so I think we have to look at the factors that make up our market structure, which actually functions very well on a normal day, but during times of stress actually sometimes doesn't, because I think what we have is a loosely coupled, fragmented market that is very deep at the top of the book, but when the market moves through that top of the book very quickly, then it is not nearly as efficient as it was in the past.

Senator REED. Thank you.

Mr. Noll?

Mr. NOLL. Thank you, Chairman Reed. Like Mr. Leibowitz and Mr. Ketchum, I don't think we are ever going to identify the precise, exact cause of May 6. However, we believe that if we can solve what we think are some of the negative outcomes of May 6, that we will avoid the issues of what the precise cause was and be able to move forward with a very robust market. So those are obviously coordinated responses across circuit breakers across all markets. We don't believe markets should compete on circuit breakers. We don't believe that markets should compete on volatility halts. We think that those things need to be consistent.

I think it is probably fair to say that we should have been able to identify that before this had occurred, but the market had never experienced this kind of liquidity dearth and this kind of an event before. So we now recognize that as a flaw and we are moving very quickly, working with one another, to fill that hole.

I do think that there are lots of positives to innovation in our different market models. NASDAQ is very proud of its market model. I know NYSE is very proud of its market model, and there is still going to be room for us to be competitive and compete on innovation and drive down costs and provide better service to investors. But in areas like this, I think it is incumbent on us to cooperate with one another and we are doing so.

Senator REED. Thank you.

Mr. Duffy, please.

Mr. DUFFY. Senator, I think that the harmonization of rules is absolutely essential, but when you are talking about 50, 60, or even more pools of liquidity, some with certain protocols, some with no protocols, it is going to be very confusing for a marketplace. So when an order gets entered into one marketplace where there is NYSE, NASDAQ, or BATS and they don't find the liquidity because of the protocols being in place, these things are trading in microseconds. They are seeking liquidity. There are going to so many other pools trying to find liquidity. Then you can find out why the prices did what they did. I don't think it is a big secret.

I think the 10, 20, and 30 percent circuit breakers need to be revisited. They may be a bit wide. We have not hit the 10 percent, as everybody has said here, so that needs to be done.

I think the stop logic functionality that the CME Group has put in place, this is patented technology. It clearly worked. The charts don't lie. The numbers don't lie. The markets stopped and we had an opportunity to replenish our liquidity. That stop market functionality kicked in in the six-handle range, which is the equivalent of a half of 1 percent of the value of the S&P contract. To us, that makes sense.

We have offered this up publicly to give it to the marketplace, even though it is under a patent by the CME Group. We think it makes sense. So we think that there are a lot of good things that we could be a part of the solution to.

Senator REED. Let me—I think it is important to try to continue to find what the course might be, because it will make the response, I think, much more attuned and much more fine. But I think the point that Mr. Leibowitz makes is we already know there are problems there and that we just can't sort of say that this is a one-off experience and it will never happen again. As fact, as I suggested in my questions to the two Chairmen, this was an accidental confluence of bad news from Europe, some trading irregularities, *et cetera,* but we all have to plan for a very deliberate attempt to undermine the market, either through some physical or some technological attack.

So in this context, do you think that you are prepared for it, one, and two, if you are not prepared for it, are you planning, at least implicitly, that in a serious enough situation that there will be support from the government to get you through a difficult moment? Mr. Duffy?

Mr. DUFFY. On an operational standpoint, there is no question that we are prepared for it. We prepared for it pre-September 11 of 2001. So we have been building remote facilities going back to 1999 and 2000. We have redundancy in multiple different locations in the Chicago metropolitan area. We don't even actually run all of our facilities out of the CME Group any longer. So we have the same set-up in New York because of our New York operations. So we are, without question, prepared for whatever needs to go forward.

As far as the legislation, we do believe that there are certain situations where everybody should have access to the discount window. I disagree with Chairman Gensler and Chairman Schapiro. I think that the CME Group or any other clearing entity, now that we are going to be potentially forced into taking clearing of some of these OTC products, we may not have an opportunity to get to our bank lines in a reasonable time. We settle our markets twice daily, and that is the reason why we haven't had the flaws in the 150 years in our system.

So I think it is important, even though we have never gone to the discount window to borrow, that we still have that ability, and not just under emergency procedures.

Senator REED. Let me just raise a point that I would like to make, or at least to put on the table, is that there was a presumption a decade ago that securitization of mortgages are not particu-

larly dangerous because, after all, who defaults on your mortgage. It is 20 percent down and if the FICO is 680. But the mortgage of 1999 was not the mortgage of 2005, where it is nothing down, no income statement, no FICO, and yet we were still treating those and securitizing those.

Now, this is not the exact analogy, but essentially, we are going to ask under this legislation the clearing platforms to take much different types of products that they are clearing today, probably more risky because they are not being cleared today—if they weren't risky, they would probably be able to make some money and do it yourself. And that, I think, goes to the point that you are making, Mr. Duffy, about that in rare circumstances, we hope, there might be need for support. So I just——

Mr. DUFFY. There is no question, sir. In the legislation, it also calls for the clearinghouse to have the right to refuse an over-the-counter transaction, which we think is critically important, because if you can't risk manage these things, the only thing they did was transfer the risk from you to me and then said you are going to blow me up. So we don't think that is a good solution. So we need to have the risk management tools in place, which we do, and we do think one of them is also to have access to the Fed window if we need it.

Senator REED. Mr. Noll, your comments, and we will go right down the line, and then I will recognize Senator Bunning.

Mr. NOLL. So from a physical security point of view, we, too, are well prepared for any break in our technology or any attack or any other break in the way our technology operates. So we have multiple facilities that back one another up and they are hot sites. They are connected to one another and the rest of the marketplace. And they are multi-State, as well, so they aren't all in the same general area. They are spread out quite a bit. So from a physical security point of view and a technology point of view, we feel quite confident that we are prepared for any sort of event like that.

In terms of clearing and access to the Fed window, while NASDAQ OMX does not operate a U.S.-based equity clearinghouse, we are a significant investor in a clearinghouse called International Derivatives Clearing Group, which is designed to clear interest rate swaps. So like most of the other participants at this table, we would think that, at the end of the day, we think clearing is a better solution than not clearing these products, but in the eventuality of ultimate risk, we do think that at some point we may need access to the Federal Government's support in the event of a major crisis.

Senator REED. Mr. Leibowitz?

Mr. LEIBOWITZ. Yes, thanks. To echo what the two previous speakers have said, I think we have hot back-up and, in fact, we are examined in rigor by our regulator to make sure that we are living up to certain standards of disaster recovery, business continuity planning of all sorts. We also have people who have security clearance for such things as with Homeland Security and other agencies, and we work very tightly with those agencies in terms of things that could come over the Internet, you know, denial-of-service attacks, other hacking events.

I agree also that the clearinghouse is going to be an issue in terms of knowing risk exposure across instruments. The world has gotten a lot more complex. We started to analogize with the financial meltdown, and I actually think you are dead on, which is, during the financial meltdown, we had a bunch of quantitative models that all said nothing could really be that bad. Each individual player thought that they were protected, and they just had not really taken account of the fact of what if it all goes bad at once and what if we all have to go through the same exit door at once and what if these things are worse than we thought. And I think we need to approach how we structured the market, how we structures our back-up, how we structure clearing facilities with all of those things in mind, or we are actually not doing a good job.

Senator REED. Final word, Mr. Ketchum.

Mr. KETCHUM. Again, while FINRA as a regulator is in a very different business than these two gentlemen for delivering real-time market executions and being involved in the clearing side, we also feel very good about our ability from a physical security standpoint, disaster back-up standpoint. We also focus intensely on potential intrusions, denial-of-service efforts, and we feel good about our protections from that side.

I will not repeat what Mr. Leibowitz said, but I think he said it extremely well.

Every conception should be challenged, and challenged regularly with markets that are changing as quickly as these are. That certainly demands some flexibility from the standpoint of the clearing changes that are going to occur and some capabilities to ensure that there remains liquidity and they remain sound.

So, FINRA feels in very good shape from the standpoint of being able to respond to attacks of any sort, but this is an appropriate issue for Congress to continue to focus on.

Senator REED. Thank you very much.

Senator Bunning, and take as much time as you want, Jim. I apologize for the lengthy time of my questioning.

Senator BUNNING. That is all right. Thank you.

Mr. Noll, I am going to start this question with you since you talked about it more in your written statement than anyone else, but I would like the others to respond as well.

As I said in my statement, I am concerned about the way some trades were canceled. Given that everyone seems to agree the system worked the way it was set up to do, how do you justify canceling trades and protecting sellers from their bad decisions?

Mr. NOLL. I share much of your concern, Senator Bunning, and it was a very difficult day to make that decision. It was done in coordination with all of the other markets on an ongoing discussion that, quite frankly, lasted many hours trying to decide what the appropriate decision was there. So we were trying to balance the needs and requirements of what we would call moral hazard issues, which is making people aware and bear the consequences of their activities in the marketplace, for good or for ill, with what was clearly a dysfunctional marketplace that was not functioning as it should function.

So in the absence of any clearly erroneous trade, we looked at the decay of what we would call price discovery and the provision

of liquidity, and we tried to draw that line, admittedly somewhat more arbitrarily than I think any of us are comfortable with, draw that line in an appropriate area where we did not reward anyone for bad behavior but we did solve the problem of what we considered to be a dearth of liquidity.

That being said, I think we are very confident that the stock-by-stock circuit breakers that we are putting into place will prevent a reoccurrence of this kind of situation.

Senator BUNNING. Looking back, we all have 20/20.

Mr. NOLL. I think that is true. So we believe that we would like to put the stock-by-stock circuit breakers in place. We think that will prevent this going forward, these kind of events going forward, but more importantly, we endorse Chairman Schapiro's desire that we have transparent, understandable, agreed upon across all markets, trade-break, clearly erroneous rules that remove the discretion from any one market actor or any group of market actors so that everyone knows visibly and clearly what those events are and how they will be triggered.

Senator BUNNING. Anybody else like to jump in. Go ahead.

Mr. LEIBOWITZ. Sure. So I had the fortune of sitting on the NASDAQ Quality of Markets Committee at the time that the first erroneous trade policy went in, and I think, Rick, you were actually——

Mr. KETCHUM. I was there.

Mr. LEIBOWITZ.——the CEO at the time or COO at the time. And it troubled me then and it troubles me now. Markets that have to resort to breaking trades as a response to conditions are just not orderly markets in my mind. That is not the way we should do our business.

I think in this case, the big challenge was not—we had institutional investors who made a mistake. You know what? You are right. They should pay the price. The challenge here was that we had retail investors who had submitted market orders that essentially went into a black hole. They had stop loss orders in high-cap stock——

Senator BUNNING. But I am sorry, sir. Sophisticated—even if they are not sophisticated, anybody that puts a market order in knows exactly what is going to happen to a market order.

Mr. LEIBOWITZ. So I would agree with you that their broker probably does, and maybe the answer is the broker should have stood up for that trade. I would submit to you that a lot of the public does not. And I will tell you——

Senator BUNNING. A lot of the public does not know that if you put a market order in, it is executed?

Mr. LEIBOWITZ. They think maybe it will go, you know, be a dollar——

Senator BUNNING. Rather than a limit order?

Mr. LEIBOWITZ. Well, they do not realize that when I trade Accenture, it is going to be down 99 percent. What are they getting now?

Senator BUNNING. I agree with that.

Mr. LEIBOWITZ. And that is——

Senator BUNNING. But if you put a market order in, that is your execution.

Mr. LEIBOWITZ. You are absolutely right in that regard, and I think we have to make sure that it just cannot happen in the market. We also need to talk about whether market orders should be allowed at all and how we educate people so these things do not happen.

But I agree, there should not be the moral hazard of breaking trades. It is not the right way to make a market function properly.

Senator BUNNING. Anyone else? Go.

Mr. DUFFY. I do believe that you need to have clarity on rules, and we have bust rule clearly put on our website so anybody that is going to participate in the CME Group markets, they know the rules prior to making a trade on our exchange.

As far as busting trades, you know, every order in our place has to have a limit on it. You cannot just order—send in a market order. So what Mr. Leibowitz is referring to is you can order—you have to have a limit on every order——

Senator BUNNING. I understand limit orders.

Mr. DUFFY. So we do not accept market orders is my point, and that is the reason why our system works. And I think that is a very important point——

Senator BUNNING. In other words, you did not have any big losses on your market.

Mr. DUFFY. There were losses. I am not saying there were not losses, sir, because the market had a lot of up and down in it. But it was important to note that the orders were not these heat-seeking missiles that could go to infinity or to zero like it did on the future.

Senator BUNNING. The one.

Mr. DUFFY. Correct, sir. Also, we think that is important.

Another reason with busting trades is if someone buys a trade and gets busted out of that trade, he might have elected to liquidate that trade prior to the bust rule coming into place. He goes home to go to sleep, and now he is short the market and had no idea he was short the market. There are some serious unintended consequences when the rules are not clear.

Senator BUNNING. Absolutely. That is what I am getting at.

What should be done so that it will be predictable when trades will be broken in the future, other than what has been suggested?

Mr. NOLL. Senator Bunning, I think what we are planning to do—as a matter of fact, Mr. Ketchum just called a meeting for all of the exchanges and the SEC early next week—I think it is on Tuesday—to come up with a set of standards about clearly erroneous and how we are going to move forward in addition to the circuit breakers that we are putting into place. So how are we going to move so that we have a very clearly defined standard of when trades are going to stand and when they will not so that we do not ever face this issue again.

Senator BUNNING. If I am in Schenectady, New York, and I am dealing with a broker-dealer in Schenectady, any broker—I am not going to give anybody a plug here—how do I compete with the electronic traders that have nanosecond access?

Mr. DUFFY. I will make a comment on that, and this is more in your line, but in capital formation markets, sir, most participants coming in for the public are not trying to compete on the bid-offer

in a nanosecond market. They are buying or selling stocks for probably a period of time——

Senator BUNNING. Hold. They are going to hold the stock.

Mr. DUFFY. They are more of a holder participant. Whereas these people that are trading in what we refer to as microseconds, we think of them as liquidity providers. They have actually tightened up the markets, but they are actually not in for that. So they are actually competing against each other——

Senator BUNNING. They may be day traders. They may be someone who is in it just for a very short period.

Mr. DUFFY. Yes, sir.

Senator BUNNING. Mr. Leibowitz, since most exchange-traded funds are listed on one of your exchanges, I am going to start this question with you, and anyone else who wants to add something can. Why do you think we saw a more severe move in exchange-traded funds than in the underlying stocks? Should investors be worried that these products are not as reliable as everyone thinks they are?

Mr. LEIBOWITZ. So I think the important think to first say is the fact that ETFs got hit as hard as they did was an effect, not a cause. They did not cause the market meltdown. They had no role in it. They were essentially the victim of the market as it went down.

Normally, there is a pretty tight arbitrage mechanism between the ETFs and the underlying instruments that make up that. During this period, that mechanism broke down because the traders who were bidding on the stocks could not tell where the actual stocks underlying the ETF were trading.

So, for example, if Accenture or some other stock, PG, was in that index, was PG at 39 or 56, or even at 39, it would lead you to bid in a very crazy place.

The other thing that is unique about ETFs is they do not tend to have deep liquidity books on the book. There is not a lot of retail orders. A lot of executions occur in wholesalers above the market. So what happens is wholesalers are committing capital to keep that market really tight.

There is an article in the Wall Street Journal today that suggests that two of the major wholesalers actually had system problems during this meltdown, and what that probably did is suck capital out of the market to commit to the ETF product and other products that allowed it to tighten up. If you couple that with stop losses, which triggered into the market—you know, and no pause in that market. The difference between what happened on NYSE and what happened in Arca is this: Both markets have market makers with obligations. But in the ETF market, both on NASDAQ's listing and Arca's, there are these things called LMMs. They have obligations. The problem was trading did not pause long enough for the books to refill and for them to commit capital. They were basically looking into a black hole, and so the function did not work properly.

So we are looking at this with the issuers and with the market in terms of how do we fix the market structure so that it works better during these periods. I think it is imperative that ETFs be included in the circuit breaker pilot.

Mr. KETCHUM. Senator, if I can, let me just add on to that point. I would first underline that it is imperative for ETFs be included in the pilot as quickly as possible for two reasons. First, ETFs, like futures, are aggregated vehicles that are the most convenient, efficient, and effective way to react when you see market risk, as you know, being involved in the industry. Therefore, they will almost always be hit very quickly with respect to any market reaction from the standpoint of selling activity or buying activity.

Second, unlike futures, as Larry indicated, they often are not that liquid, at least given the wide range of those products that have been developed over time. So this is an area where we absolutely have to move quickly to include beyond the S&P 500.

I also have to just note, Senator, as someone who was born and raised in Schenectady, I want to thank both you and Senator Warner for particularly singling out your concerns in Schenectady. I will speak for the city, and we appreciate it.

Senator BUNNING. Schenectady, it is an old town I played ball in, so I remember it very well.

Mr. KETCHUM. I actually watched you when you played for the Blue Jays.

Senator BUNNING. You are not that old.

[Laughter.]

Mr. KETCHUM. I am pretty close.

Senator BUNNING. Mr. Ketchum, I am going to start you with this question since you mentioned it in your written statement, but I would like to hear from anyone else, also.

In your statement, you said that changes in the marketplace have eliminated meaningful market makers' obligations. What changes should be considered to market makers' rules to reflect the current marketplace and the rules of new type of liquidity providers?

Mr. KETCHUM. Well, Senator, I think that is a very good question, without a simple answer. I start by believing in competition, and much of the reason for changes in market maker obligations have been by the SEC's effort to encourage competition across markets. But it is a reality that today in a number of marketplaces there are not obligations "reasonably related to the market."

I would say two things need to happen quickly. The first thing is where there is not an obligation to quote reasonably related to the market, there should not be two-sided quote obligations, and perhaps they should not benefit from a margin and capital standpoint. But you have to eliminate stub quotes to avoid these ridiculous trades down at a penny, 5 cents, *et cetera.*

Second, I think there needs to be an evaluation—and Chairman Schapiro committed to it afterwards—to look hard at whether the requirements that used to exist—that required regular quoting and participation in the market if you were to benefit from market making status—should be reconsidered. You raised that question earlier because I know you have been involved in the industry, and personally I believe that ought to be reviewed and reconsidered.

Senator BUNNING. Anybody else?

Mr. LEIBOWITZ. Sure. I think this is a really serious question, which is: Where is all the liquidity in the market? And who has got an obligation to the market?

For one thing dark pool liquidity may have been sitting off on the side, and when the market went down, it was not included at all. It did not help essentially provide a backstop to the market.

Over time, a lot of the markets have evolved to speed over obligation, and so what happens is, for example, we have DMMs on NYSE. LMMs exist on both Arca and NASDAQ for ETFs. Looking at the stub quotes, that is a sign of a problem, not a problem itself. What really happened—I am dating myself again—is the NASDAQ market makers used to have a requirement for quoting close to the market, but they also had a requirement of how deep they made the market and what size they had to buy at every price. As the market evolved to a faster, more electronic marketplace, those market makers were not able to keep up, and as a result, their requirements kept getting thinned out to the point where really the only requirement is that they have equity in the market, it does not matter where. Hence, the penny at a thousand. What that does is it gives them other rights in the marketplace, like internalizing orders.

The real question is: What do you owe to the market in exchange for that right that you have got? And that is the sort of thing that we all need to look at, you know, in our individual——

Senator BUNNING. Or the market maker.

Mr. LEIBOWITZ. And collectively.

Senator BUNNING. OK. Thank you.

Senator REED. Well, thank you, Senator Bunning. Your experience is obvious in terms of the thoughtful questions that you have not only posed today but consistently.

I think the hearing has indicated that you gentlemen and the regulators have a lot of work to do, and we have got a lot of work to do. This is an evolving issue, and we fortunately missed the worst outcome in this situation. But I cannot feel after today we can assure ourselves that we will not have other challenges ahead. In fact, I think we all understand we have to do a lot more to understand this problem, series of problems, and to take effective action.

I thank you. This has been a very helpful beginning, as I suggest, of a series of hearings that we shall hold about the status of the markets, high-frequency trading, market makers' responsibilities, and the interconnection of all of these aspects.

If my colleagues have any written statements or additional questions, I would ask them to submit them no later than next Thursday, May 27th. I would also ask the witnesses to submit responses to questions within 2 weeks. And, obviously, all of the written testimony that you submitted will be made part of the record, and any other items that you would like to submit to the record will be made part of the record.

Without additional information, the hearing is adjourned.

[Whereupon, at 12:01 p.m., the hearing was adjourned.]

[Prepared statements and responses to written questions supplied for the record follow:]

PREPARED STATEMENT OF CHAIRMAN JACK REED

I want to welcome Chairman Schapiro, Chairman Gensler, and our other witnesses to today's hearing, and thank them for making time in their very busy schedules to testify on this important topic.

I also appreciate their efforts following the events of May 6th to coordinate the investigations, report their findings, and quickly propose circuit breaker and other changes in response.

This week the Senate is on the verge of making fundamental and urgently needed changes to reform Wall Street and protect consumers and investors. In the midst of this important debate, Senator Bunning and I felt it was important to hear your thoughts on the causes of the events of May 6th, and to discuss any changes that may be needed to ensure that our markets function in a fair and orderly way going forward.

As we know, on May 6, 2010, starting around 2:40 p.m., the stock market plummeted, but then quickly recovered. At its lowest point during this 20-minute incident, the Dow Jones Industrial Average had fallen 9.2 percent, erasing more than $1 trillion in market capitalization within a matter of minutes.

Although the Dow average rebounded to end the day down only 3.2 percent, the May 6 intraday trading loss on the Dow index not only exceeded the extreme market volatility that occurred during the height of the financial crisis in the fall of 2008, but it also represented the index's largest intraday percentage drop since the October 1987 crash.

This Committee has regularly held hearings examining the equity markets, most recently in October to discuss dark pools, flash orders, and high-frequency trading. Today's hearing is another check-up on our equity markets, particularly amidst concerns that technological developments in recent years may be posing new risks to investors and/or the markets more broadly.

Electronic trading has evolved dramatically over the last decade, and it is important that regulators keep evolving with these developments. Trading technology today is measured not in seconds or even milliseconds, but in microseconds, or one millionth of a second.

Today's hearing will help to answer some important questions about the causes of the May 6 market volatility. In addition to speaking about the causes of the plunge, I've asked today's witnesses to discuss what role automated trading, high-frequency trading, and other technological advances may have played in the market disturbance.

I've also asked them to discuss the extent to which disparate trading conventions and rules across various markets contributed to the down and up spike. And I've asked them to discuss any changes to Regulation NMS or other laws or regulations may be necessary to mitigate such market fluctuations in the future.

Finally, I'd like to discuss whether the regulators have all the tools and authorities they need to investigate market disturbances or whether legislative or other changes may be needed to help them more quickly identify the causes of extreme market disturbances.

PREPARED STATEMENT OF MARY L. SCHAPIRO

CHAIRMAN, SECURITIES AND EXCHANGE COMMISSION

MAY 20, 2010

I. Introduction

Chairman Reed, Ranking Member Bunning, and Members of the Subcommittee:

I appreciate the opportunity to testify concerning the market disruption that occurred on May 6, 2010.[1] The sudden decline and recovery of the U.S. financial markets on that day was unprecedented in its speed and scope. It is vital that investors and listed companies feel confident in the integrity of the prices generated by our equities markets.

During a 20-minute period during the afternoon of May 6, the U.S. financial markets failed to live up to their essential price discovery function. That period of gyrating prices directly harmed those investors who traded based on flawed price discovery signals, and it undermined the confidence of investors in the integrity of the markets. We are committed to taking all necessary steps to identify causes and con-

[1] My testimony is on my own behalf, as Chairman of the SEC. The Commission has not voted on this testimony.

tributing factors and are already working to reduce the likelihood of a recurrence of that day.

Over the last 14 days, the SEC has focused intensely on moving forward on two separate, but related, fronts. First, we, along with the Commodity Futures Trading Commission (CFTC), have been engaged in a comprehensive investigation into the events of May 6 to gain a full understanding of what caused the volatility. Second, even as we work to understand the causes of the volatility, we have worked with the exchanges to fashion effective measures that will operate to help protect against a recurrence by imposing a limit on the extent to which prices can move in individual stocks before there is a pause in trading. We are also addressing a number of additional areas that may have contributed to the volatility. These are discussed below.

With respect to our investigation, this past Tuesday, SEC and CFTC staff issued a joint report of their preliminary findings regarding the market events of May 6 to the Joint CFTC–SEC Advisory Committee on Emerging Regulatory Issues (Staff Report).[2] The establishment of the Committee was one of the recommendations included in the agencies' joint harmonization report issued last year.[3] The Staff Report sets forth the preliminary findings of the ongoing review of the events of May 6. It briefs the Advisory Committee regarding the events and provides context regarding the current structure of the equity and futures markets, and the regulatory framework for those markets. The Staff Report is intended to assist the Advisory Committee as it works with us to review the events of May 6. I expect that the Committee will advise the Commission with respect to market structure problems that may have led to the volatility experienced on that day and suggest potential approaches.

In addition, earlier this week, the stock exchanges and the Financial Regulatory Industry Authority (FINRA) filed proposals that would aid in preventing the type of severe price swings that some individual stocks in the S&P 500 experienced on May 6. These rules would establish a market-wide 5-minute trading pause in the event that the price of a stock in the S&P 500 moves more than 10 percent during the preceding 5 minutes. The pause would give the markets the opportunity to attract additional liquidity in the stock, establish a reasonable market price, and resume trading in a fair and orderly fashion.

My testimony today first will summarize the events on May 6, using the best information that is available at this point. Next, it will give a brief summary of initial steps taken to identify the causes and contributing factors of the unusual market activity on May 6, as well as initial steps to help protect against such activity from occurring in the future. Finally, I will discuss various potential regulatory responses that need to be considered in determining how best to maintain fair and orderly financial markets and to prevent subsequent severe market disruptions.

II. Summary of Events on May 6, 2010

A. Chronology of Trading

On Thursday May 6, the stock markets had spent much of the morning and early afternoon in moderately negative territory, with the Dow Jones Industrial Average ("DJIA") declining 161 points, or approximately 1.5 percent, by 2:00 p.m. (ET). Concerns over the financial situation in Greece, uncertainty concerning elections in the United Kingdom, and an upcoming jobs report, among other things, hung over the market. Shortly after 2:30 p.m., however, the market decline began to steepen and, by 2:42 p.m., the DJIA was at 10,445.84, representing a decline of approximately 3.9 percent. The DJIA then suddenly dropped an additional 573.27 points, representing an additional 5.49 percent decline, in just the next 5 minutes of trading, hitting 9,872.57 at 2:47 p.m., for a total drop of 9.16 percent from the previous day's close (which, as discussed below, was not sufficient to trigger the existing circuit breaker trading halt).

Our preliminary analysis shows that this precipitous decline in stocks (and the subsequent recovery) followed very closely the drop (and recovery) in the value of the E-mini S&P 500 future (which tracks the normal relationship between futures and stock prices for the broader market). Similar declines were seen in stock market indexes other than the DJIA, such as the S&P 500 Index. In addition, the CBOE Volatility Index ("VIX"), a widely followed measure of market volatility sometimes known as the "fear index," climbed above 40, a level not reached in over a year.[4]

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[2] *Report of the Staffs of the CFTC and SEC to the Joint Advisory Committee on Emerging Regulatory Issues,* May 18, 2010. *http://www.sec.gov/sec-cftc-prelimreport.pdf.*

[3] *Joint Report of the SEC and the CFTC on Harmonization of Regulation,* October 16, 2009.

[4] *See* Appendix A, Figures 2 and 3.

As quickly as the market dropped, it suddenly and dramatically reversed itself, recovering 543 points in approximately a minute and a half, to 10,415.65. By 3 p.m., the total daily decline in the DJIA had been reduced to 463.05 points (4.26 percent). The DJIA ended the day at 10,520.32, down a total of 347.80, or 3.20 percent, from the prior day's close. This represented a significant down day for the markets, but the closing numbers belied the market's dramatic moves down and then up during approximately 20 minutes of trading in the mid-afternoon. In addition, as has been widely reported in the press, many individual securities experienced much larger swings in their trading activity. For example, two DJIA components—Procter & Gamble and 3M—experienced declines of approximately 36 percent and 18 percent, respectively. In addition, trades in certain stocks were executed at absurdly low prices, such as one stock which opened above $40, was traded at one point at a penny, and then closed the day above $40. Figure 1 in Appendix A illustrates the volatility of this activity. This extreme volatility in the markets suggests the occurrence of a very severe temporary liquidity failure, rather than the effect of any economic factor that might explain price discovery indicating that the equity value of U.S. listed companies truly could drop and recover such a large amount in just a few minutes.

In addition, a large number of registered investment companies known as Exchange Traded Funds ("ETFs") traded for short periods of time with massive intraday price swings. The shares of more than 25 percent of all ETFs experienced temporary price declines of more than 50 percent from their 2:00 p.m. market prices. One large ETF sponsor reported to us that 14 of its domestic stock ETFs experienced executions of $.15 or less per share (including five ETFs that had executions of one cent or less) while also observing that its domestic bond ETFs appeared to execute at reasonable prices. We also will explore whether the practice of shorting ETFs by institutional investors to effectively eliminate broad market exposures might have contributed to the intraday price swings experienced by certain ETFs.

B. Breaking of Clearly Erroneous Trades

As the markets closed on May 6, officials from each of the equity markets, pursuant to exchange rules, worked out a common standard to cancel trades that were effected at prices that were sharply divergent from prevailing market prices (so-called "clearly erroneous" trades). The exchanges determined to cancel any trades effected from 2:40 p.m. to 3 p.m. at prices 60 percent away from the last trade at or before 2:40 p.m. Transactions in 326 individual securities were canceled in this manner. In addition, on Friday May 7, several options exchanges similarly decided to cancel certain options trades from the afternoon of May 6.

A significant number of broken trades were in the shares of ETFs. These funds are hybrids—they are mutual funds that have shares that trade throughout the day like ordinary stocks. ETF sponsors reported to us that, internally, they experienced no significant problems in managing the funds on May 6. Stability had returned to the market by the 4:00 p.m. market close and, as a result, these funds were able to calculate their net asset values based on the market prices of the securities in their portfolios as required by our rules. From the viewpoint of the ETFs, they saw nothing out of the ordinary or unusual compared to any other day in computing their end-of-day net asset values.

Information on broken trades clearly suggests that ETFs as a class were affected more than any other category of securities. We continue to investigate precisely why they were affected so dramatically.

C. Evaluation of Trading

The Commission is committed to understanding fully and exactly what occurred on the afternoon of May 6, and has been aggressively investigating and analyzing the events of that day. We believe it is critical to understand the causes and effects of this event so that we can work to ensure that it does not occur again. Throughout this time, the Commission and its staff have been in close and continuous contact with the CFTC and other Federal agencies, as well as the larger national securities exchanges, FINRA, and clearing organizations. In addition, we have been in contact with a wide variety of market participants, including broker-dealers, proprietary trading firms, and asset managers. We have obtained extensive data from the exchanges and other market participants and are in the process of analyzing that data to ascertain the triggers and impacts of trading that day.

The Commission also has been in close contact with our foreign counterparts. Some of our counterparts have circuit breaker-like market intervention mechanisms linked to our own and others have market intervention mechanisms that halt trading on specific securities affected by unexpected market volatility. This coordination

will continue as we seek information on specific trades or events that may have precipitated any problems.

The various regulatory authorities are making substantial progress in analyzing the trading on May 6 and sifting through the voluminous trading records involved (including more than 17 million trades in listed equities between 2:00 p.m. and 3:00 p.m. alone). We will continue to provide investors and the public with information on the events that may have contributed to this volatility as it becomes available, as we have done with our preliminary staff report issued this week, but we should recognize that it will take time to fully analyze the data and cross test our different hypotheses.[5] Although developments in the markets and in technology may help speed access to market data, they also greatly complicate our efforts to analyze the complex web of trading arrangements and market dynamics that have developed since 1987. For example, the key day in the 1987 Market Break Study involved a trading session processing a little over 600 million shares in NYSE stocks. On May 6, the markets processed 10.3 billion shares in NYSE stocks alone.

In addition, the interconnections among markets and among equity securities and derivatives have grown immensely more complex over the past few years. Orders in one stock directed to one market can now ricochet to other markets and trigger algorithmic executions in other stocks and derivatives in milliseconds. By contrast, in 1987, investigators could focus their attention on discrete transactions largely effected on only one or two markets.

To conduct our analysis, we are obtaining and reviewing data regarding order books and order audit trails from various sources to understand the behavior of providers and consumers of liquidity. This involves billions of data elements regarding millions of trades in thousands of securities executed in milliseconds. This data will be the subject of targeted analysis by SEC staff.

We plan to examine in more detail data on options transactions and quotes to better understand the role that participants in this market may have played.[6] We also expect to examine existing data on institutional mutual fund and ETF holdings, as well as data from broker-dealers that will help attribute trades to specific brokerage accounts. In addition, we will examine trade and order characteristics to determine whether specific order types played a role in the breakdown of the price discovery mechanism.

Another key component of our analysis is examining the behavior of groups of market participants. For example, we will continue to examine the role of providers of liquidity, including market participants who have formal obligations under the Federal securities laws or SRO rules. To the extent that data is available, we will seek to understand the impact of traders following high-frequency or algorithmic trading strategies. Many proprietary trading firms engage in automated strategies that continually monitor the various markets and products for disparities in prices. When the trading systems for these firms spot such disparities, they can generate in microseconds an enormous volume of orders that are intended to capitalize on these disparities. We also will examine the activities of ETF Authorized Participants in order to understand what, if any role, they played, in the markets of May 6.

Even as our investigation into this matter continues, a preliminary picture is beginning to emerge. At this point, we are focusing on the following working hypotheses and findings—

(1) possible linkage between the precipitous decline in the prices of stock index products such as index ETFs and the E-mini S&P 500 futures, on the one hand, and simultaneous and subsequent waves of selling in individual securities, on the other, and the extent to which activity in one market may have led the others;

(2) a generalized severe mismatch in liquidity, as evinced by sharply lower trading prices and possibly exacerbated by the withdrawal of liquidity by electronic market makers and the use of market orders, including automated stop loss market orders designed to protect gains in recent market advances;

(3) the liquidity mismatch that may have been exacerbated by disparate trading conventions among various exchanges, whereby trading was slowed in one venue, while continuing as normal in another; (4) the use of "stub quotes", which are designed to technically meet a requirement to provide a "two sided quote" but are at such low or high prices that they are not intended to be executed;

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[5] The report setting forth the events of the October 1987 Market Break was released months later, in January 1988.

[6] Our initial options analysis suggests that there were not triggers originating from the options markets.

(4) the use of market orders, stop loss market orders and stop loss limit orders that, when coupled with sharp declines in prices, for both equity and futures markets, might have contributed to market instability and a temporary breakdown in orderly trading; and

(5) the impact on ETFs, which suffered a disproportionate number of broken trades relative to other securities.

We have found no evidence that these events were triggered by "fat finger" errors, computer hacking, or terrorist activity, although we cannot yet completely rule out these possibilities.

As we move forward in our inquiry into the events of May 6, we are focusing on several important issues.

1. Linkages between Futures and Securities Markets

One focus has been the role of the E-mini S&P 500 future in leading the market decline and recovery. To a great extent, this concern reflects a basic fact of market dynamics—much of the price discovery for the broader stock market occurs in the futures markets. Those who believe that the broader market is overpriced (or underpriced) often will first sell (buy) futures for a broad market index rather than sell (buy) the individual stocks that make up that index. Moreover, many professional traders study the relationship between futures prices and stock prices. If they see a decline (rise) in the price of the futures compared to the price of the stocks, they will sell (buy) the underlying stocks in expectation that the stock prices quickly will follow the futures price. Indeed, this type of activity helps assure that stock prices will closely follow futures prices up or down.

Accordingly, given that the E-mini S&P 500 futures price fell by more than 5 percent in a few minutes and then quickly recovered all of the 5 percent decline, it should be no surprise that the broader stock market indexes showed similarly fast and similarly large declines and recoveries. It must be recognized, however, that the fact that stocks prices follow futures prices chronologically does not demonstrate what may have triggered the price movements. The triggering factor may have been an event in the futures market (such as an exceptionally large order), but it could have been other factors as well. In the coming days, we intend to pursue this critically important linkage between the derivatives and equities markets that so significantly affects the price discovery that indicates the value of individual listed companies and of investor portfolios.

2. Absence of Professional Liquidity Providers

According to anecdotal evidence, as well the large number of trades that executed against stub quotes, as discussed below, it appears that some professional liquidity providers [7] temporarily did not participate in the market on the buy side in many stocks that suffered particularly egregious price declines, whether because of an intentional decision to withdraw or because of specific market practices. Some types of professional liquidity providers have "affirmative" obligations to provide liquidity whether the market is up or down, as well as "negative" obligations not to take liquidity in ways that would destabilize the markets. Other professional liquidity providers do not have such responsibilities, including some of the high frequency proprietary trading firms that also are discussed below.

There is evidence that some firms that had previously been active participants in the markets withdrew their liquidity after prices declined rapidly. These firms may have acted appropriately under current rules, as a firm's risk models may have concluded that the action in the market presented too substantial a risk. As discussed below, however, we are looking at the data and considering the types of obligations that should apply to certain liquidity providers.

3. Disparate Exchange Practices

The decline in the market on May 6 also focused attention on disparate exchange practices for dealing with major price movements and other unusual trading conditions. One of these is the NYSE's mechanism for "liquidity replenishment points" ("LRPs"). The NYSE utilizes a hybrid floor/electronic trading model, unlike most other markets today which are fully electronic. There are disagreements regarding whether the one model performed better than another in these circumstances.

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[7] Professional liquidity providers are proprietary traders in the business of providing liquidity to the market, often through the submission of limit orders that rest on the electronic order books of exchanges and other trading venues. They include registered entities, such as exchange specialists and market makers, as well as unregistered proprietary trading firms that engage in passive market making and other types of trading strategies.

Although the ultimate answer to that question requires additional study and analysis, it is useful to describe the effect a certain feature of the NYSE had on market movements that day. In attempting to meld the traditional open-outcry floor-based auction model with today's technology, the NYSE's trading system utilizes what are known as "liquidity replenishment points," or LRPs. LRPs are best thought of as a "speed bump" and are intended to dampen volatility in a given stock by temporarily converting from an automated market to a manual auction market when a price movement of sufficient size is reached. In such a case, trading on the NYSE in that stock will "go slow" and pause for a time period to allow the Designated Market Maker to solicit additional liquidity before returning to an automated market. This "speed bump" occurs even when there may be additional interest beyond the LRP price point.

On days of major market volatility, stocks with significant and continual declines may cause NYSE trading to remain in the "go slow" mode for extended periods or to intermittently return to automated execution status before quickly again hitting another LRP and thereby "going slow" again. Some have suggested that this practice caused a net loss of liquidity as orders were routed to other markets still offering automated executions. Others believe that the LRP mechanism served to attract additional liquidity that helped soak up some of the excess selling interest. We will examine the role and operation of LRPs to assess their effect on overall market quality and intend to promptly finalize this analysis. If any adverse effects on overall market quality are identified, we will take immediate steps to rectify that impact. We are focusing on whether the disparity in exchange practices can be addressed to promote more consistency in how orders are handled in the context of rapidly changing prices without undermining the benefits of individual market practices.

An exchange typically will route an order to another exchange when the other exchange is displaying a better price. The routing exchange does this to avoid "trading through" the other exchange, that is, executing the order at a price worse than is available at the other exchange. When one exchange believes that another exchange is experiencing systems problems, the exchange may declare what is called "self-help" against the other exchange. After declaring "self-help," the declaring exchange may trade through the quotations of the other exchange. The result of a self-help declaration is that the declaring exchange will exclude the quotations of the other exchange from its determination of whether the other exchange has a better "protected" price to which it must route orders for execution. Appendix B provides additional detail on Regulation NMS.

On the afternoon of May 6, just prior to the steep market decline, NASDAQ and NASDAQ OMX BX declared self-help against NYSE Arca, thereby excluding NYSE Arca's quotations (and liquidity) from their routing tables. The NYSE Arca has asserted that it did not experience systems problems that would warrant the declaration of self-help. We are investigating these issues and whether there needs to be greater consistency in exchange practices with respect to the self-help mechanism.

4. Exchange-Traded Funds

Of the U.S.-listed securities with declines of 60 percent or more away from the 2:40 p.m. transaction prices, which resulted in their trades being canceled by the exchanges, approximately 70 percent were ETFs. This suggests that ETFs as a class were affected more than any other category of securities.

Based on our analysis to date, we are focused on a number of issues that may have contributed to the ETFs' experience, including:

- Because ETFs generally track securities market indices, the extraordinary price declines in certain individual securities likely contributed to the ETF price declines. For the most part, the severe ETF price declines followed, in time, the sharp decline in the broad markets. ETFs that track bond indices generally did not experience severe price declines. We therefore are reviewing the linkages between ETF price declines and the declines in the equity market.
- The role of market makers and authorized participants in ETFs, and whether an inability to hedge their ETF positions during periods of severe volatility may have contributed to a lack of liquidity in ETF shares.
- The use of ETFs by institutional investors as a way to quickly acquire (or eliminate) broad market exposures and whether this investment strategy led to substantial selling pressure on ETFs as the market began to decline significantly. We also will explore whether the practice of shorting ETFs by institutional investors to effectively eliminate broad market exposures might have contributed to the intraday price swings experienced by certain ETFs.

- The impact of ETF stop loss market orders, particularly from retail investors, on the overall ETF market price declines.
- Given that NYSE Arca is the primary listing exchange for almost all ETFs, whether the impact that the declaration of "self-help" against NYSE Arca by other exchanges may have impacted NYSE Arca-listed stocks generally and ETFs in particular. The loss of access to NYSE Arca's liquidity pool may have had a greater impact on market liquidity and trading for ETFs.

5. Other Factors

A variety of other factors likely contributed to or potentially exacerbated the events of May 6. For example, many of the securities that were subject to trade cancellations were thinly traded, including certain exchange-traded funds and preferred stocks. For such illiquid securities, a large order or influx of orders easily can soak up available liquidity across the market, resulting in an order, particularly if it is a market order, breaking through many price levels in an effort to obtain an execution at any price. A market order is an order to buy or sell a stock at the best available current price. Market orders do not require an execution at a specific price or price range. With market orders, the order submitted generally is assured an execution; however, there is no limit on what the execution price can be. This contrasts with limit orders, which are submitted with a specified limit price. Limit orders guard against executions at prices at which the order submitter is not willing to trade, though the tradeoff is that the order may not be executed if the market suddenly moves away from the suggested limit price.

In addition, the effect of market orders on prices may have been further exacerbated on May 6 by the use of stop loss market orders. These orders turn into market orders when the stop price of the order is reached. When an investor places a stop loss market order, the investor is instructing the broker to sell a stock at the market if it falls to a certain price. In a normal market, where liquidity exists as the stock price goes up or down, this strategy can protect an investor from taking a major loss if the stock drops significantly by selling at a predetermined price to minimize the loss. However, on May 6, the use of market orders when stop loss orders were triggered may have led to automated selling that resulted in executions at aberrant prices.

Furthermore, the absurd result of valuable stocks being executed for a penny likely was attributable to the use of a practice called "stub quoting." When a market order is submitted for a stock, if available liquidity has already been taken out, the market order will seek the next available liquidity, regardless of price. When a market maker's liquidity has been exhausted, or if it is unwilling to provide liquidity, it may at that time submit what is called a stub quote—for example, an offer to buy a given stock at a penny. A stub quote is essentially a place holder quote because that quote would never—it is thought—be reached. When a market order is seeking liquidity and the only liquidity available is a penny-priced stub quote, the market order, by its terms, will execute against the stub quote. In this respect, automated trading systems will follow their coded logic regardless of outcome, while human involvement likely would have prevented these orders from executing at absurd prices. As noted below, we are reviewing the practice of displaying stub quotes that are never intended to be executed.

Finally, we are examining the effect of short selling during the decline in prices. While short selling did not account for a disproportionate percentage of trading volume over the course of the day, our analysis thus far of broken trades has found that short sales accounted for a very high percentage (70–90 percent) of executions against stub quotes between 2:45 p.m. and 2:55 p.m. Notably, short sale executions against stub quotes would be subject to the alternative uptick rule (Rule 201) adopted by the SEC in February 2010, with a compliance date in November 2010.

6. Initial Steps

On the Monday following the events of May 6, I met here in Washington with the leaders of six markets—New York Stock Exchange, NASDAQ Stock Market, BATS Exchange, Direct Edge ECN, International Securities Exchange, and Chicago Board Options Exchange—and FINRA, to discuss the causes of market events of May 6, the potential contributing factors, and possible market reforms. The meeting was productive and collaborative, and there was a strong consensus that the type of aberrational volatility experienced on May 6 is wholly unacceptable in our markets.

Earlier this week, the national securities exchanges and FINRA filed proposed rules for uniform market-wide circuit breakers for individual securities in the S&P 500 Index that experience a rapid price movement.

Under the proposed rules, which are subject to Commission approval following the completion of a comment period, trading in a stock would pause across U.S. equity markets for a 5-minute period in the event that the stock experiences a 10 percent change in price over the preceding 5 minutes. The pause would give the markets the opportunity to attract additional liquidity in an affected stock, establish a reasonable market price, and resume trading in a fair and orderly fashion. Initially, if approved, these new rules would be in effect on a pilot basis through Dec. 10, 2010. The markets can use the pilot period to make appropriate adjustments to the parameters or operation of the circuit breaker as warranted based on their experience, and to expand the scope to securities beyond the S&P 500 (including ETFs) as soon as practicable.

The proposed rules are available on the SEC's website as well as the websites of each of the exchanges and FINRA. The Commission is publishing the proposed rules for a 10-day public comment period, and will determine whether to approve them shortly thereafter. Circuit breakers for individual securities across the exchanges should help to limit significant volatility, promote orderly markets, and bolster investor confidence.

In addition, during the pilot period, I have asked the SEC staff to consider ways to address the risks of market orders and their potential to exacerbate sudden price moves, as well as to consider steps to deter or prohibit the use by market makers of "stub" quotes, which are not intended to indicate actual trading interest. The staff also will study the impact of other trading protocols at the exchanges, including the use of trading pauses by individual exchanges that supplement the market-wide circuit breakers, and "self-help" protocols that allow the markets to avoid routing to exchanges that are perceived to be responding too slowly. The SEC staff also will continue to work with the exchanges and FINRA to improve the process for breaking erroneous trades, by assuring speed and consistency across markets. Another area of review is the need to consider recalibrating market-wide circuit breakers currently on the books—none of which were triggered on May 6.

As noted above, SEC and CFTC staff recently issued a joint report of preliminary findings regarding the market events of May 6 to the Joint Advisory Committee on Emerging Regulatory Issues. The Committee will hold its first meeting Monday. The Commission looks forward to working with the Committee, whose first charge is to review the market break and make recommendations related to market structure issues that may have contributed to the volatility experienced on that day, as well as disparate trading conventions and rules across various markets.

The following week, on June 2, the Commission will hold a roundtable with various market participants to discuss the structure of the securities markets. In publishing notice of the roundtable in the Federal Register, the Commission has solicited public comment on the current market structure including how well it is serving various market participants. The roundtable will provide an open forum for market professionals, investors, and academics to express their views on the current market structure, possible causes of the unusual trading activity on May 6, and ways to improve the markets to ensure that, first and foremost, our markets are fair and orderly.

Finally, our inspections and enforcement staff also have been fully integrated into our review of the events of May 6. I am deeply concerned about the effects that this volatile market had on investors, especially retail investors whose trading orders may not have behaved as they were intended or who otherwise may have been unfairly harmed. The SEC has received numerous complaints from investors, for example, who used stop loss orders to protect them from rapidly declining markets. It appears that some investors' accounts were liquidated as share prices plummeted only to have stock prices close significantly above their sale prices. We are looking at a wide variety of actions on May 6 involving the full range of market participants. We will examine such things as whether market professionals fully met their obligations, including, where applicable, their best execution obligations, and whether the decision to bust trades was made and applied fairly and consistently among investors. If we identify any activity that violates the securities laws, we will take appropriate action.

III. Potential Regulatory Responses

To the extent there was anything positive in the events of May 6, it was that the markets proved to be resilient and recovered quickly. Nevertheless, such a severe market disruption harms investors and the markets generally. First, it harms those investors who may have traded at erroneous prices. For example, many investors use stop loss orders that are triggered by significant price moves and can liquidate positions at very unfavorable prices. Other investors may see a precipitous price de-

cline and initiate new orders to sell to minimize losses. These new orders likewise may liquidate positions at very unfavorable prices for the investor.

Some of these trades may be canceled and some may not. But even for trades that are canceled, they may cause losses for those investors and traders who stepped in and bought during the midst of a severe price decline. These investors and traders accepted the risk of a market meltdown and significant losses, but, if their trades are canceled, were not rewarded for their willingness to buy when everyone else was selling. Finally and more generally, such disruptive price movements undermine the confidence of investors in the integrity and fairness of our markets, undermining the essential function of supporting capital formation.

In response to the global economic crisis and evolving market practices, the Commission had already undertaken a number of initiatives to strengthen the integrity our markets, even before the events of May 6. In February, for example, the Commission adopted a short sale circuit breaker. That rule is designed to limit short selling where an individual stock is under stress and has experienced a decline of 10 percent from the previous day's close. At that point, the restrictions of the rule provide assurances to investors that short sellers are not taking the stock down, while retaining the value of short selling in the price discovery process. In so doing, we believe that the rule will promote investor confidence.

The market events of May 6 add greater urgency for the Commission to vigorously pursue a number of meaningful initiatives to promote investor confidence in the integrity and fairness of the securities markets, including a number of proposals already underway. I first will address additional initiatives relating to time out mechanisms, destabilizing short-term trading strategies, and correction of erroneous trades. I will conclude by noting various initiatives already proposed or soon to be considered that may help address disruptive market conditions.

A. New Initiatives

In January, the Commission published a concept release on equity market structure ("Market Structure Concept Release") that highlighted many aspects of today's highly automated markets and requested public comment on a wide variety of issues. The Market Structure Concept Release was designed to further the Commission's broad review of market structure to assess whether its rules have kept pace with, among other things, changes in trading technology and practices.

The events of May 6 implicate a number of issues raised in the Market Structure Concept Release. For example, it asked whether the current market structure appropriately minimizes the short-term volatility that can be harmful to long-term investors. It asked whether the relatively good performance of the market structure in 2008 indicated that systemic risk was appropriately minimized in the current market structure and, if not, what further steps the Commission should take to address systemic risk. Finally, it noted the dominant role of HFT firms in today's market structure and observed that they had largely replaced the role of specialists and market makers with affirmative and negative obligations for market quality. More specifically, the Market Structure Concept Release asked whether there is any evidence that proprietary firms increase or reduce the amount of liquidity provided to the market during times of stress. It also discussed various types of short-term trading strategies, including "directional" strategies, such as "momentum ignition," that could present serious problems in today's market structure by exacerbating short-term volatility.

The public comment period on the Market Structure Concept Release ended on April 21. The Commission has received more than 100 comment letters reflecting a broad range of perspectives. Many of the letters set forth detailed views on very complex issues, and the Commission continues to review them carefully.

In addition, the Commission has published a series of concrete market structure proposals that are designed to strengthen the U.S. securities markets and to protect investors. These include the proposal to prohibit flash orders and the proposal to increase the transparency of "dark" pools of liquidity, as well as the market access proposal (discussed below) to strengthen broker-dealer risk management controls and the large trader reporting proposal (also discussed below) to enhance the Commission's surveillance and enforcement capabilities.

The events of May 6 demonstrate the urgency and importance of these efforts and provide a valuable concrete example of how the market structure performed under particularly stressful conditions. As such, they highlight particular regulatory steps that warrant close attention in the near future.

1. Destabilizing Short-Term Trading Strategies

In addition to focusing on liquidity, we must also consider the sources of the selling pressure that can suddenly generate such enormous demand for liquidity to buy.

What triggered the selling pressure? What types of market participants were selling and what types of trading strategies were they pursuing?

For example, to what extent, if at all, did the wave of selling on May 6 come from proprietary firms employing "directional" strategies triggered by signals that attempt to exploit short-term price movements? These directional strategies were discussed in the Market Structure Concept Release and include "momentum ignition" strategies that are designed to start and exacerbate price movements. It is too early to know whether short-term professional trading strategies played any role in the events of May 6. If they contributed significantly to the precipitous decline, however, we must consider whether additional regulatory requirements are necessary.

For example, in the past, professional liquidity providers with the best and fastest access to the markets were charged with affirmative and negative obligations to promote market quality. One of the most significant negative obligations was a restriction on "reaching across the market" to take out quotations and thereby drive prices up or down. Many of the most active and sophisticated traders in today's market structure are not subject to any obligations with respect to the nature of their trading. If active trading firms exploited their superior trading resources and significantly contributed to the severe price swings on May 6, we must consider whether regulatory action is needed to address the problem.

2. Fair and Consistent Process and Policies for Correcting Erroneous Trades

We also must work with the various exchanges and other trading venues to assure that the process and policies for dealing with the correction of erroneous trades are fair for investors and consistently applied—both in the context of a single event and across different events. Currently, the threshold level for correcting trades is set by the exchanges on a case-by-case basis. The particular level that is chosen may affect investors and other market participants in profound and varying ways. Obviously, the primary objective should be a market structure that minimizes to the greatest extent possible any need to correct erroneous trades. When necessary, however, the process and policies should be applied in a consistent manner under established rules that are fair to investors.

B. Ongoing Initiatives

1. Market Access Proposal

In January, the Commission proposed a rule that would require effective risk management controls for broker-dealers with market access, including those providing customers sponsored access to the markets. Our proposal would effectively prohibit the growing practice by some broker-dealers of providing "unfiltered" sponsored access, where a customer is permitted to directly access the markets using the broker-dealer's market participant identifier but without the imposition of effective pre-trade risk management controls. All broker-dealers accessing the markets should implement controls to effectively manage the risks associated with this activity, and our proposal would unequivocally require them to do so. These risks include the potential breach of a credit or capital limit, the submission of erroneous orders as a result of computer malfunction or human error, and the failure to comply with regulatory requirements. Effective risk management controls for market access are necessary to protect the broker-dealer, the markets, the financial system, and ultimately investors. Such controls would help prevent trading activity that could trigger a market disruption. We have received numerous comment letters on our sponsored access proposal and the staff is considering those comments and will soon make a recommendation to the Commission. I expect the Commission to act on this important proposal by this summer.

2. Large Trader Reporting Proposal

Last month, the Commission proposed to create a large trader reporting system that would enhance our ability to identify large market participants, collect information on their trades, and analyze their trading activity. To keep pace with rapid technological advances that have impacted trading strategies and the ways in which some market participants trade, the Commission must be able to readily identify large traders operating in the U.S. securities markets, and obtain basic identifying information on each large trader, its accounts, and its affiliates. In addition, to support its regulatory and enforcement activities, the Commission must have a mechanism to track efficiently and obtain promptly trading records on large trader activity.

The current system for collecting transaction data from registered broker-dealers is generally utilized in more narrowly focused investigations involving trading in particular securities, and is not generally conducive to larger-scale market recon-

structions and analyses involving numerous stocks during periods of peak trading volume. In addition, existing tools often require weeks or longer to compile trading data to identify potentially large traders. The Commission's need to develop the tools necessary to readily identify large traders and be able to evaluate their trading activity is heightened by the fact that large traders, including certain high-frequency traders, are playing an increasingly prominent role in the securities markets.

The proposed rule would enhance the Commission's ability to identify those "large trader" market participants that conduct a substantial amount of trading activity in U.S. securities, as measured by volume or market value. In addition, the proposal would facilitate the Commission's ability to obtain from broker-dealers records of large trader activity. By providing the Commission with prompt access to information about large traders and their trading activity, the proposed rule is intended to facilitate the Commission's efforts in reconstructing market activity and performing analyses of trading data, as well as assist in investigations of manipulative, abusive, and other illegal trading activity.

3. Consideration of Consolidated Audit Trail Proposal

One of the challenges we face in recreating the events of May 6 is the reality that the technologies used for market oversight and surveillance have not kept pace with the technology and trading patterns of the rapidly evolving and expanding securities markets. There are mechanisms already in place to coordinate surveillance among markets. For example, the Intermarket Surveillance Group provides a framework for the sharing of information and the coordination of regulatory efforts among exchanges trading securities and related products to address potential intermarket manipulations and trading abuses. However, audit trail requirements vary between markets, resulting in a lack of current, readily accessible securities order and execution data. Today's fast, electronic, and interconnected markets demand a robust consolidated audit trail and execution tracking system.

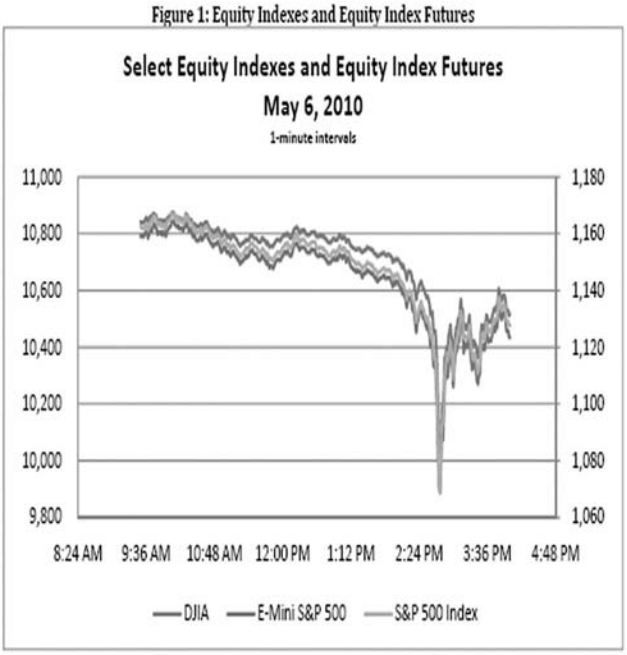
Since last summer, SEC staff have been working, in consultation with SROs and others, on a rule proposal that would require the SROs to jointly develop, implement and maintain a consolidated order tracking system, or consolidated audit trail. Next week, the Commission will consider this rule proposal, which should result in a continuous reporting mechanism for market participants that would capture the data needed for effective cross-market surveillance. The proposed changes will significantly improve the ability to conduct timely and accurate trading analyses for market reconstructions and complex investigations, as well as inspections and examinations. Indeed, I expect that the proposed consolidated audit trail would result in our ability to access in real time the majority of the data needed to reconstruct the type of market disruption that occurred last week, with remaining information available within a matter of days rather than weeks. A consolidated audit trail would be invaluable to enhance the ability to detect and monitor aberrant and illegal activity across multiple markets, and would greatly benefit investors and help to restore trust in the securities markets.

IV. Conclusion

In conclusion, the events of last week are unacceptable. The SEC is engaging in a comprehensive review and is taking the necessary steps to implement additional safeguards to prevent the type of unusual trading activity that occurred briefly last week. The Commission is considering a number of proposals that will address key issues raised on May 6 and we will move expeditiously to address all issues we determine caused or contributed to those events.

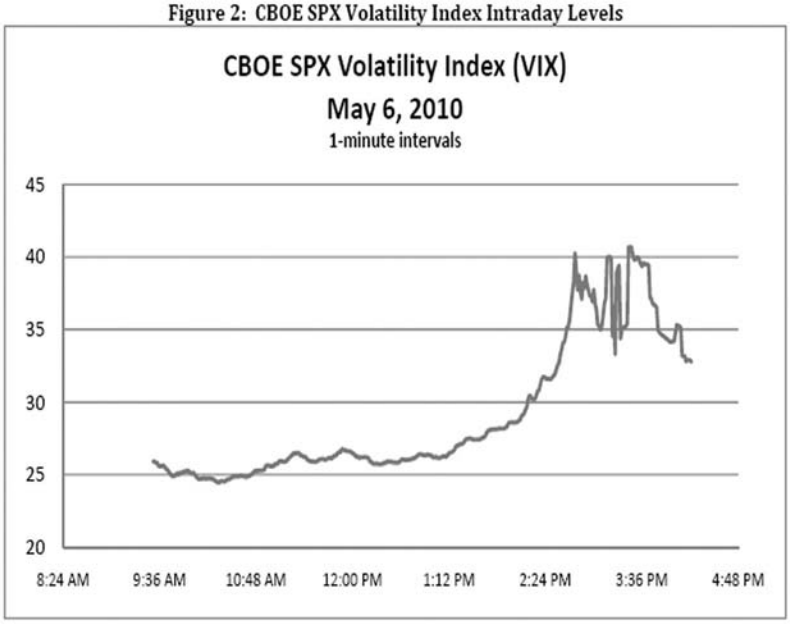
APPENDIX A

Figure 1: Equity Indexes and Equity Index Futures



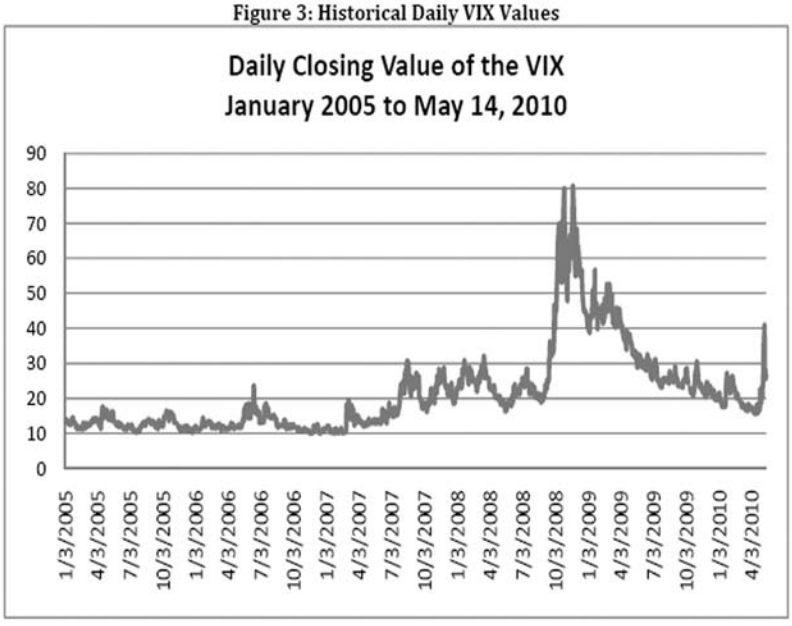
Source: Bloomberg

Figure 2: CBOE SPX Volatility Index Intraday Levels



Source: Bloomberg

Figure 3: Historical Daily VIX Values



Source: Bloomberg

APPENDIX B

Overview of U.S. Securities Market Structure

A. The National Market System and Regulation NMS

In Section 11A of the Securities Exchange Act of 1934 (added to the Act in 1975), Congress directed the Commission to facilitate the establishment of a national market system for securities in accordance with specified findings and objectives. Congress recognized that the securities markets are an important national asset that must be preserved and strengthened, and that new data processing and communications techniques create the opportunity for more efficient and effective market operations. It mandated a national market system composed of multiple competing markets that are linked through technology. A national market system should be contrasted with a structure in which trading is confined to a single trading venue, such as one particular exchange. Congress determined that promoting competition among trading venues and giving as many market makers as possible an opportunity to provide liquidity in stocks would promote greater liquidity and price continuity than a single dominant trading venue.

Over the years, the Commission has sought to keep market structure rules up-to-date with continually changing economic conditions and technology advances. The most recent major updating of the national market system rules occurred in 2005, when the Commission adopted Regulation NMS. Regulation NMS addresses four areas: (1) a "trade-through" rule that prevents the execution of trades at prices that are inferior to a displayed and immediately accessible quotation on another trading venue; (2) an "access" rule that, among other things, promotes private linkages among market participants and trading venues; (3) a "sub-penny" rule that prohibits the display, ranking, or accepting of orders with sub-penny prices; and (4) amendments to the joint-industry plans for collecting and distributing consolidated market data to the public.

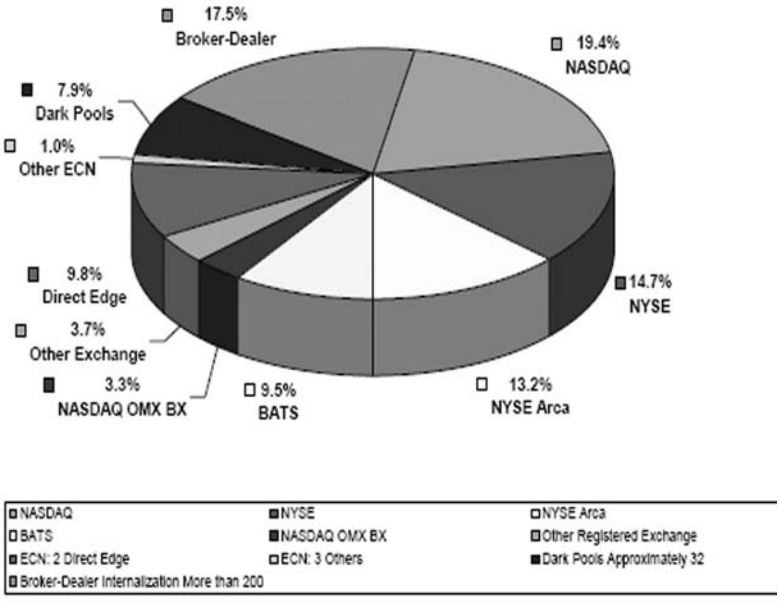
The trade-through rule is probably the most well-known aspect of Regulation NMS and arguably has affected the markets most significantly since it was adopted in 2005. The Regulation NMS trade-through rule eliminated a prior rule that benefited dominant exchanges with trading floors by protecting their manual quotations (that is, orders were required to be routed to the exchange in an attempt to access a manual quotation that could take as long as 10-20 seconds, rather than to another venue with an immediately accessible quotation at an inferior price). To compete under the new regulatory structure, all exchanges developed electronic systems that are capable of providing immediate responses to incoming orders and updating their quotations immediately. These systems enable the exchanges to display quotations that are protected against trade-throughs. Trade-through protection was designed to promote best execution and price stability by preventing one trading venue from ignoring the immediately accessible quotations of another trading venue in a downturn (as well as upturn). The trade-through rule does not protect a trading venue's quotation if it is not immediately accessible, which, as discussed further below, is the case with the quotations displayed by the NYSE when it hits an LRP.

B. The Nature of Trading in the Current Market Structure

At least partly as a result of Regulation NMS, trading in U.S.-listed stocks has changed dramatically in recent years. Trading volume now is dispersed among many different trading venues. For example, the share of the New York Stock Exchange in the trading in NYSE-listed stocks declined from 79.1 percent in 2005 to 25.1 percent in 2009. Nevertheless, more than 70 percent of volume continues to be executed by public trading venues that display quotations across a wide range of U.S-listed stocks. Figure 1 below sets forth the major types of trading venues, along with estimates of their trading volume in September 2009:[8]

Figure 1

Trading Centers and Estimated Percentage of Share Volume in NMS Stocks September 2009



[8] Sources of estimated trading volume percentages: NASDAQ; NYSE Group; BATS; Direct Edge; data compiled from Forms ATS for 3d quarter 2009.

The exchanges and other trading venues have adopted highly automated trading systems that can offer extremely high-speed, or "low-latency," order responses and executions. The average response times at some exchanges, for example, have been reduced to less than 1 millisecond. Many exchanges also offer individual data feeds that deliver information concerning their orders and trades directly to customers. To further increase speed in transmitting market data and order messages, many exchanges also offer co-location services that enable exchange customers to place their servers in close proximity to the exchange's matching engine.

Highly automated trading systems have helped enable a business model for a new type of professional liquidity provider that is distinct from the more traditional exchange specialist and over-the-counter ("OTC") market maker. In particular, proprietary traders now use high speed systems by submitting large numbers of orders that can result in more than 1 million trades per day by a single firm. These proprietary traders often are labeled as engaging in high-frequency trading ("HFT"), though the term does not have a settled definition and may encompass a variety of strategies in addition to passive market making.

HFT traders can be organized in a variety of ways, including as a proprietary trading firm (which may or may not be a registered broker-dealer and member of FINRA), as the proprietary trading desk of a multi-service broker-dealer, or as a hedge fund (all of which are referred to hereinafter collectively as a "proprietary firm"). Other characteristics often attributed to proprietary firms engaged in HFT are: (1) the use of extraordinarily high-speed and sophisticated computer programs for generating, routing, and executing orders; (2) use of co-location services and individual data feeds offered by exchanges and others to minimize network and other types of latencies; (3) very short time-frames for establishing and liquidating positions; (4) the submission of numerous orders that are cancelled shortly after submission; and (5) ending the trading day in as close to a flat position as possible (that is, not carrying significant, unhedged positions over-night). Given the competitive pressures to maximize their speed of trading, HFT firms typically will attempt to streamline the code for their trading algorithms. However, every check and filter in that code reduces its speed, creating a tension.

HFT is one of the most significant market structure developments in recent years. Estimates of HFT volume in the equity markets vary widely, though they often are 50 percent of total volume or higher. By any measure, HFT is a dominant component of the current market structure and is likely to affect nearly all aspects of its performance.

C. Intermarket Circuit Breakers and Time Out Mechanisms of Individual Trading Venues

One aspect of the current market structure that pre-dates Regulation NMS is the intermarket circuit breakers that apply across all trading venues in the national market system. The only intermarket circuit breakers for stocks are established in NYSE Rule 80B, though all securities trading venues have agreed to halt trading in accordance with the provisions of NYSE Rule 80B. In addition, the futures markets have agreed to halt

trading in equity securities-related futures in accordance with the provisions of NYSE Rule 80B.

Rule 80B establishes a very broad mechanism that is based on the 30 stocks of the DJIA. It is not currently triggered by the trading in any individual stock. The numerical triggers for NYSE Rule 80B last were updated in 1998 and apply at three levels of price decline – 10 percent, 20 percent, and 30 percent. The first triggering point is a 10 percent decline in the DJIA from its closing value on the previous trading day. If the decline occurs before 2:00 p.m. Eastern time, all trading venues will halt trading for one hour in all stocks, security options, and securities-related futures. If the decline occurs between 2:00 p.m. and 2:30 p.m., trading is halted for 30 minutes. If the 10 percent decline occurs after 2:30 p.m., trading is not halted unless a decline reaches the second level of 20 percent.

If a decline reaches 20 percent before 1:00 p.m., trading is halted for two hours. If it occurs between 1:00 p.m. and 2:00 p.m., trading is halted for one hour. If a 20 percent decline occurs after 2:00 p.m., trading is halted for the remainder of the day. Finally, if a decline in the value of the DJIA reaches 30 percent at any time, trading is halted for the rest of the day.

Notably, none of the NYSE Rule 80B thresholds was triggered on May 6, despite the severe disruption in trading in many stocks. This issue is addressed below in the context of potential regulatory initiatives to prevent severe market disruptions in the future.

Separate and apart from the intermarket circuit breakers established in NYSE Rule 80B, trading venues can establish their own "time out" mechanisms designed to address significant price movements. These time out mechanisms can be more (but not less) restrictive than those in NYSE Rule 80B. An example of such a time out mechanism is the LRP mechanism established solely for the NYSE by its Rule 1000. The LRP mechanism applies at the level of individual stocks, and the thresholds for triggering the mechanism vary by type of stock. In general, however, an LRP is triggered by price declines in the range of 1-3 percent that occur within a 30-second time period. When triggered, the NYSE will display a "non-firm" quotation that cannot be accessed by incoming orders and therefore is not protected against trade-throughs by other trading venues. In the particular case of price declines, trading venues are entitled to trade at prices lower than the NYSE's non-firm bid quotation during an LRP mechanism. During the LPR mechanism, the NYSE's Designated Market Maker for a stock attempts to solicit additional liquidity before returning the NYSE to an automated market.

D. Automated Trading and Severe Market Disruptions

It is important to recognize that severe market disruptions in the form of precipitous price declines are not exclusively associated with automated trading. Disruptions are caused by a glut of sellers willing to trade at any price, combined with the near or total absence of buyers at a particular instant in time (who may themselves be

influenced by the wave of sell orders crashing on the market). In these circumstances, prices can decline precipitously, as they did in many stocks on May 6.

Severe market disruptions have occurred throughout financial market history in a wide variety of market structures. For example, the U.S. equities markets declined by 22.6 percent on October 19, 1987 in a market structure that was dominated by a single manual trading venue. More recently, of course, and particularly since the implementation of Regulation NMS, the U.S.-listed equity markets have become much more automated and much faster. Nevertheless, they generally were able to continue operating smoothly even through the global financial crisis that reached a peak during the autumn of 2008. Accordingly, the inability of the equity markets to maintain fair and orderly trading in many stocks on May 6 is profoundly disappointing and troubling.

STATEMENT OF GARY GENSLER

CHAIRMAN, COMMODITY FUTURES TRADING COMMISSION

BEFORE THE

SENATE COMMITTEE ON BANKING, HOUSING, AND URBAN AFFAIRS

SUBCOMMITTEE ON SECURITIES, INSURANCE, AND INVESTMENT

May 20, 2010

Good morning Chairman Reed, Ranking Member Bunning and members of the Subcommittee. I thank you for inviting me to today's hearing on the unusual volatility in the capital markets on May 6, 2010. I am pleased to testify alongside Securities and Exchange Commission (SEC) Chairman Mary Schapiro.

Staff of the Commodity Futures Trading Commission (CFTC) and SEC released a joint report on Tuesday that presented their preliminary findings regarding May 6's market events. I wish to thank the staffs of both agencies and compliment their dedication for working tirelessly and cooperatively to issue this detailed report in such short order. I will touch on some of those findings in my testimony today. The two agencies also announced last week the creation of a Joint CFTC-SEC Advisory Committee on Emerging Regulatory Issues that will take as its first project reviewing and analyzing the market events of May 6.

Those market events had significant implications for the investing public and American businesses. It is essential that we continue our review of the contributing circumstances of the

price volatility and provide recommendations to promote the integrity of our markets. More work must be done to accomplish this goal. It is central to our mission that markets are fair, orderly and transparent.

I will focus my testimony this morning primarily on issues related to the futures marketplace and leave Chairman Schapiro to address the securities markets.

The Equity Index Futures Markets

Before I turn to the events of May 6, I will discuss the makeup of the stock index futures markets.

Stock index futures are derivatives contracts that trade on central exchanges. Much like a crude oil futures contract is based upon the price of crude oil, a stock index futures contract is a cash settled derivative based on the value of a stock market index. Futures on many broad based U.S. stock indices, including the S&P 500, the Nasdaq 100 and the Dow Jones Industrial Average, trade on the Chicago Mercantile Exchange (CME). Futures on other U.S. stock indices, including the Russell 2000 Index, trade on the IntercontinentalExchange, Inc. (ICE). The stock index futures marketplace consists almost entirely of futures contracts based on these four principal stock indices. The total outstanding notional value of the futures contracts on

these indices is approximately $360 billion. This compares to a total U.S. equity market value of approximately $13 trillion.

By far the most active stock index futures contract is the E-Mini S&P 500 ("E-Mini") contract, which is based on the value of the S&P 500 Stock Index. E-Mini futures account for more than 80 percent of the notional value of stock index futures open interest on U.S. exchange and represented 78 percent of the trading volume of stock index futures (on broad based indices of U.S. stocks) on May 6. E-Mini futures trade on the CME Globex electronic trading system, which operates nearly 24 hours a day from Sunday evening to Friday afternoon.

Algorithmic Trading, Automated Execution and Electronic Market Making

Futures market trading until recent years largely was transacted through open outcry among participants physically standing on the exchange trading floor. Today, 88 percent of futures and options trading on the CME is done electronically. The E-Mini contract is 100 percent electronic. The move from trading on the floor of an exchange to electronic trading introduced significant changes in trading methods. These include algorithmic trading, automate execution and electronic market making.

Algorithmic trading refers to the practice of using computer algorithms to direct order entry into electronic trading platforms. An algorithmic trading strategy establishes in advance

the parameters of each trading order, such as the time of submission, the price and the quantity. One of the goals of an algorithmic trading strategy is to meet preset trading targets – average price and the total quantity to buy or sell. Once such a target is established, an algorithmic trading program directs orders into electronic trading platforms. These strategies often are executed without human intervention.

Algorithmic trading is utilized by a variety of market participants, most notably by executing brokers to facilitate customer orders as well as by high frequency traders making markets in individual futures contracts or securities.

Automated execution of large orders often consists of dividing a large trade into many small trades with the goal of achieving the best average price. Automated execution is widely used by large investors such as pension funds or asset managers to acquire or hedge their exposures in different markets: cash, futures or options. This service is provided to investors by executing firms (those who have access to the exchanges' electronic trading platforms). The investor chooses the appropriate algorithm by making only a few clicks on a drop down menu provided on the executing firm's system. For example, an investor can select the time period over which an order needs to be executed, the largest percentage of total volume that transactions can represent, and the portion of the order that will be visible to others in the market. The client clicks "OK" and the algorithm begins sending bid or offer messages to the trading platform.

Automated trading strategies also are used by traders engaging in market making. Algorithmic market making broadly consists of placing limit orders, either as offers to sell above the current market price or bids to buy below the current market price. The goal of this strategy is to earn the bid-offer spread on lots of transactions. Algorithmic market makers generally do not access the markets in the same way that investors using algorithmic trading do. They do not, for example, use pull down menus or click OK. They tend to design their own algorithms to quickly, often in a manner of microseconds, get their orders into the trading platforms.

Other algorithmic trading strategies include cross-market arbitrage, which looks for price discrepancies across markets, trend following and mean reversion. Execution of these algorithmic strategies may facilitate cross-market linkages when an order executed in one market transmits its price impact to other markets. A further algorithmic high frequency trading strategy is referred to as "sniping" or "sniffing." This strategy submits and quickly cancels orders, looking for hidden pockets of liquidity.

Electronic Futures Trading Market Protections

In this new environment of electronic trading platforms, where sometimes no human interaction occurs, it is essential to have robust market protections. Both CME Globex and the ICE trading systems have automatic safety features – termed "pre-trade risk management functionality" – to protect against errors in the entry of orders (such as "fat finger" errors) and

extreme price swings. These features help ensure fair and orderly markets. Based on the rise of algorithmic trading and the events of May 6, we need to review whether further protections are needed in these fast paced computer driven markets and, if so, what those measures are.

First, CME and ICE electronic trading systems both automatically reject orders priced outside ranges of reasonability, also known as price bands. This feature prevents clearly erroneous orders from triggering a sequence of market-moving trades that later may require cancellation.

Second, both CME and ICE have maximum order size limitations that prevent entry into the trading engine of an order that exceeds a predefined maximum quantity.

Third, both CME and ICE have protections with regard to "stop loss" orders. Such orders are triggered, for example, if the market declines to a level pre-selected by the person entering the order.

Fourth, CME Globex has stop logic functionality that protects against cascading stop orders – the domino effect of one stop order triggering others. Globex's stop logic functionality pauses trading for five to ten seconds – five seconds in the case of the E-Mini contract – when the trading engine recognizes that it has a series of resting stop orders that could lead to a cascade and move the market up or down beyond a specified amount. On May 6, the stop logic

functionality occurred on two currency futures contracts and when the E-Mini contract hit bottom.

Preliminary Findings

The staffs of the CFTC and SEC have worked countless hours to issue preliminary findings related to the causes of the market disruption of May 6. Much work, however, remains to examine the events of that day. At this stage, there are a number of key themes that we are reviewing.

Preliminary staff findings suggest that a confluence of economic events, signals from other markets and a marked increase in sell orders (in comparison to buy orders) culminated in a significant dislocation of liquidity in the E-Mini contract. This liquidity dislocation also was preceded by some reduction in activity of certain liquidity providers.

Exchanges and market participants have stated their belief that it is unlikely that a "fat finger" mistake caused the heavy volatility of May 6. To date the CFTC staff review produced no evidence indicating that a "fat finger" was the catalyst.

News in the Marketplace

On May 6, there were two types of news that were hitting the markets. There was general economic news coming into the market that could affect the valuation of securities and derivatives as well as news coming from within the market, such as traders looking to market events in making their trade decisions.

Economic News

May 6 began with turbulent skies in the marketplace. Many financial news outlets were reporting on the uncertainties emanating out of Europe. Premiums were higher on credit default swaps on many European sovereign debt securities, including debt of Greece, Portugal, Spain, Italy and Ireland. The broad U.S. equity market declined as the S&P fell nearly 2 percent from its previous day's close by 2 PM. The volatility associated with this uncertainty was reflected in the Chicago Board Options Exchange SPX Volatility Index, which was 61.6 percent higher than May 5's close at the height of the volatility.

Market News

On May 6, market participants would have been able to observe a number of indicators of market uncertainty. Those indicators both were symptoms of uncertainty and, when transmitted to the broader markets, may have contributed to investor concerns.

The market saw a flight to quality, indicating greater market uncertainty:

- The 10-year Treasury yield fell from 3.58 percent on the prior day to an intraday low of 3.26 percent with a concurrent change in price of Treasury futures.
- The price of gold futures rose steadily from approximately $1,180 to $1,210 per Troy ounce from the open to 1:30 pm.
- Shortly after 1:00 pm, the Euro began a sharp decline against both the U.S. dollar and the Japanese Yen.

There also were a number of additional market signals that may have been relevant to market participants.

First, from 2:00 pm to 2:30 pm, there was a significant increase in liquidity replenishment points (LRPs) at the New York Stock Exchange (NYSE). LRPs act as "speed bumps" and are intended to dampen volatility in a given stock by temporarily converting from an automated market to a manual auction market when a price movement of sufficient size is reached.

Second, after 2:00 pm, the already existing market decline accelerated and implied volatility sharply increased. A number of equity exchange traded funds were declining more than the broader market. Similarly, at least eight closed-end mutual funds had declined by 50 percent or more by 2:24 pm.

Third, we saw declarations of self-help by a number of exchanges interacting with NYSE/Arca. Self-help permits one trading center to bypass the quotes of another trading center if the affected center repeatedly fails to respond to orders within a one-second time period.

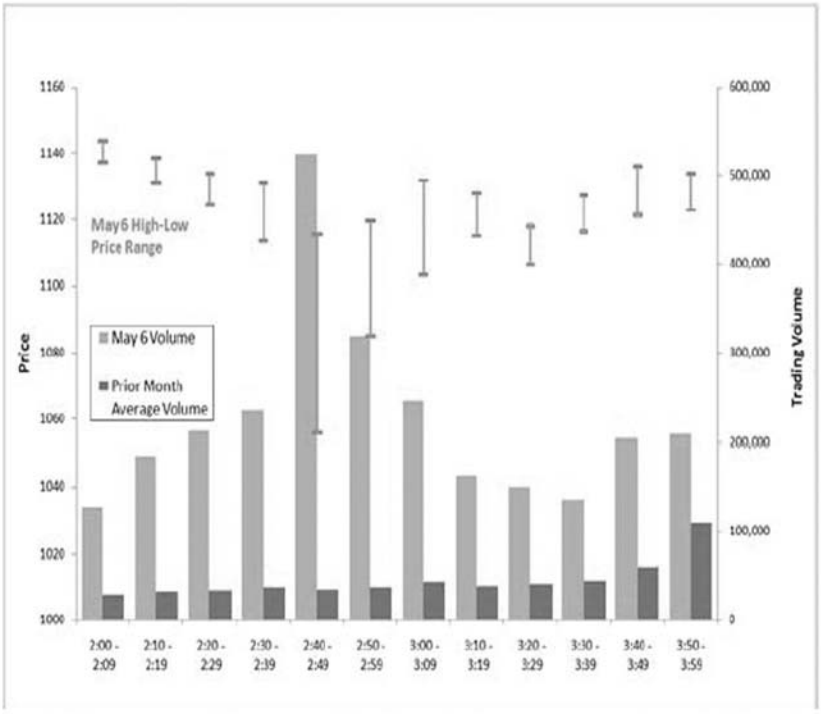
Liquidity

On May 6, there was a significant dislocation of liquidity in the E-Mini contract. Liquidity reflects the ease with which certain amounts of an asset can be bought or sold without exerting a significant effect on its price. A high level of liquidity can help facilitate fair and orderly trading.

Although market liquidity is not directly observable, CFTC staff reviewed multiple indicators of liquidity in E-Mini futures: trading volume, bid/offer spreads and the depth of the limit order book. High liquidity may manifest itself as high trading volume, narrow bid/offer spreads and/or high depth of the order book.

On May 6, trading volume was very high. Usually, high volume indicates high liquidity. On this day, however, high volume could have been a misleading indicator of liquidity to market participants and their pre-programmed algorithms. Higher trading volume, when it is associated with high price change, may not be a good indicator of liquidity because many orders could have been executed at falling prices. This particular high trading volume was accompanied by

significant fluctuations in trading volume. Further, the daily trading activity did not result in a significant increase in the number of futures contracts held by market participants at the end of May 6. This implies many investors participated in the market intraday, but on balance few investors increased their positions by the close of trading. The figure below illustrates May 6 trading volume in relation to the prior month's average volume.

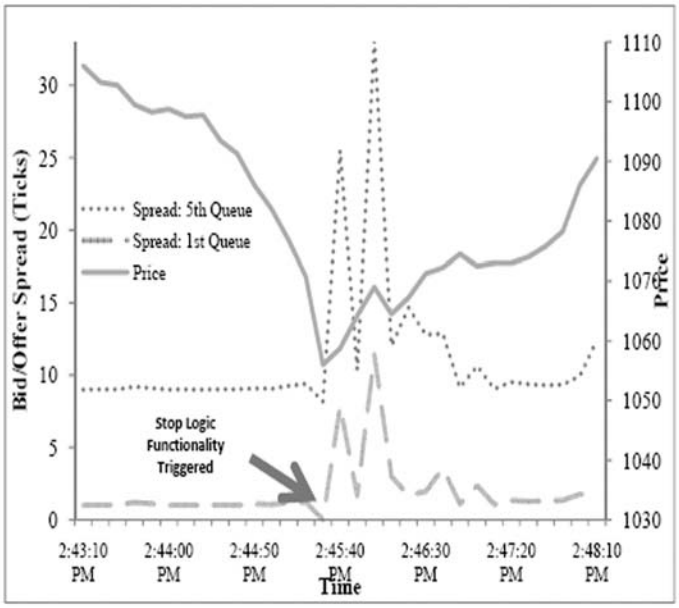


Source: CME Group

The two other measures of liquidity we reviewed – the bid offer spread and the depth of the limit order book – suggest that liquidity was dislocated. When the CME's stop logic

functionality took effect on the E-Mini contract, the bid ask spread had widened significantly. This means the liquidity was lower and the transaction costs were higher.

The figure below presents the bid/offer spreads for the first best and fifth best quotes of the E-Mini contract, focusing on the period between 2:43 pm and 2:48 pm.

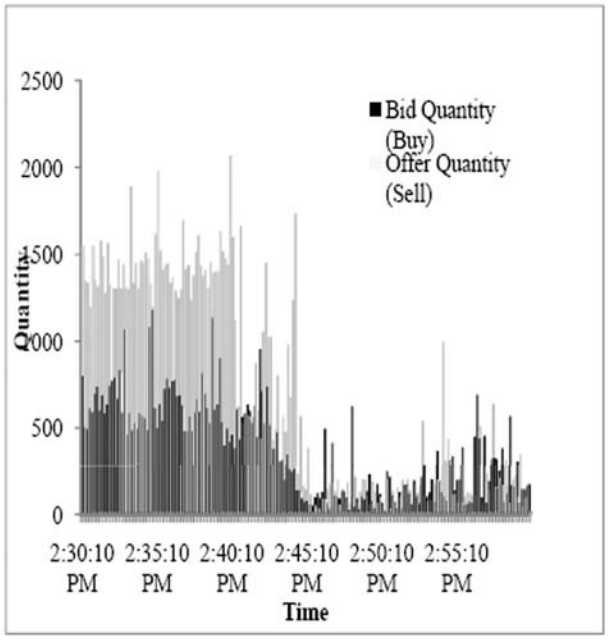


Source: CME Group

At 2:30, the depth of the limit order book also indicated an order imbalance. There were many more resting sell orders than buy orders in the limit order book. At about 2:45 pm, as the price declined, the depth of the limit order book declined dramatically. Essentially, the evidence

suggests that there may have been many more sellers than the market could accommodate at that point in time.

The following figure illustrates the depth at the fifth best bid and offer quotes between 2:30 and 3:00 pm. It shows that significant order imbalances existed between orders to buy and orders to sell. At around 2:45, depth declined dramatically.



Source: CME Group

Starting at 2:45:28 pm, CME's Globex stop logic functionality initiated a five-second pause in trading in the E-mini S&P 500 futures. This functionality was initiated when the last transaction

price would have triggered a series of stop loss orders that, if executed, would have resulted in a cascade in prices outside a predetermined "no bust" range (6 points in either direction in the case of the E-mini). The prices of the E-Mini traded at a higher price coming out of the reserve period of this pause.

Large Traders

CFTC staff reviewed the trading activity of the ten largest traders in the E-Mini market by net volume and by gross volume to ascertain whether there were significant imbalances between large buyers and sellers in the market. For two intraday time periods – 2:30 to 2:45 pm and 2:46 to 3:00 pm – the net volume was computed for each account in the E-Mini contract. During the period from 2:30 to 2:45 pm the top ten net buying accounts bought 51,526 contracts more than they sold. The top ten net selling accounts sold 72,186 contracts more than they bought. During the period from 2:46 to 3:00 pm, the top ten net buying accounts bought 49,180 contracts more than they sold. The top ten net selling accounts sold 67,544 contracts more than they bought.

In addition, CFTC staff identified the top ten most active accounts by gross volume between 2:00 pm and 3:00 pm. Of those ten, nine trading accounts executed trades on both the long and short side of the market. For these trading accounts, there was a relative balance of activity between the long and short sides of the market.

One of the top ten most active trading accounts by gross volume between 2:00 pm and 3:00 pm only entered orders to sell. That trader entered the market at around 2:32 pm and finished trading at roughly 2:51 pm. The trader sold just less than half of its contracts as the market went down and just more than half as the price level rose.

We understand that this particular market participant sought to hedge its stock portfolio in the futures markets by selling a pre-determined amount of futures through an executing broker's automated execution system. In this circumstance, we further understand that the trade was executed through an executing broker's algorithm that was meant to limit market impact by limiting volume at an average of nine percent of the volume traded during that period.

When a market participant limits their trading volume in such a way, it generally is doing so to try to limit market impact. In normal markets, market participants would anticipate lower market impact by restricting their volume to some single digit percent because they generally view that higher volume is a reasonable proxy for better liquidity.

In the market on May 6, however, as the staff preliminary review indicates, higher volume did not necessarily mean better liquidity. Such a volume restriction built into an automated execution algorithm may have been ineffective and may have had an unintended market impact. From 2:30 pm to 3:00 pm, however, this market had 10 times higher volume than the average daily trading volume for the same intraday time period over the previous month,

without the concurrent increase in liquidity. On May 6, it took about 21 minutes for the participant to execute their sell order. In markets with average volume, it would have taken significantly longer – perhaps hours.

Next Steps

The CFTC will continue its analysis into the events of May 6. Specifically, CFTC staff is carefully reviewing the activity of the largest traders in stock index futures.

Staff intends to pursue a joint study to examine the linkages between correlated assets in the equities, options and futures markets. The study could partly focus on examining cross-market linkages by analyzing trading in stock index products such as equity index futures, ETFs, equity index options and equity index over-the-counter derivatives using, to the extent practicable, market data, special call information and order book data.

Changes in the marketplace to electronic execution demand adequate protections for the public. We intend to carefully review the activities of executing firms that act as gateways into electronic trading platforms. We will ensure that computer algorithms that interact with each other and meet in a central marketplace – those of executing brokers, high-frequency traders and market makers, amongst others – do not threaten fair and orderly markets.

As the CFTC continues to review the role high-frequency and algorithmic trading played in the market events of May 6, we also are considering a rule related to co-location.

Separately, we also are considering a rule related to account identification so that the CFTC can collect better and more-detailed information on each trader in the futures markets.

Once again, I want to thank Chairman Schapiro and the SEC staff for the cooperative and highly professional way they have worked with the CFTC on these matters.

I thank you for inviting me to testify today. I look forward to your questions.

PREPARED STATEMENT OF RICHARD G. KETCHUM

CHAIRMAN AND CEO, FINANCIAL INDUSTRY REGULATORY AUTHORITY

MAY 20, 2010

Chairman Reed, Ranking Member Bunning and Members of the Subcommittee:

I am Richard Ketchum, Chairman and CEO of the Financial Industry Regulatory Authority, or FINRA. On behalf of FINRA, I would like to thank you for the opportunity to testify today.

I would also like to commend SEC Chairman Mary Schapiro and CFTC Chairman Gary Gensler for their leadership during the last 2 weeks. They swiftly engaged with exchange leaders and regulators and established a collaborative process to coordinate review of all relevant market data, as well as to identify measures that could be taken quickly to significantly reduce the chances of a recurrence of the severe market disruption that occurred on May 6.

There remains much more work to do, both in terms of diagnosing what led to the market drop May 6 and identifying additional proactive steps we may want to take to ensure that our markets are able to function more efficiently under highly volatile conditions. Ultimately, we all realize that the extreme market volatility 2 weeks ago underscored the need for regulators, and others operating in and around financial markets, to step back and recognize that with the immense changes in the market, there is a serious need to look at market structure, and identify a variety of measures that can enhance the information regulators receive to ensure market integrity and the protection of investors.

Efforts Undertaken Since May 6

Immediately after the market events on May 6, FINRA, in coordination with the SEC and other self-regulatory organizations (SROs), began the process of trying to identify unusual activity that could have contributed to the rapid market drop. Even before the market data had been fully collected, FINRA staff reviewed clearly erroneous trade filings and, along with NYSE Regulation, interviewed the approximately 20 firms with significant activity during the period of the decline. Along with NYSE Regulation, we contacted the firms to determine whether "fat finger" or other trading errors occurred, either as a result of proprietary or customer activity. None of the firms contacted identified any trading errors or other unusual activity on their part, nor has any firm come forward since, nor has any evidence been developed to indicate that a single large trade or basket of trades entered in error played a role in the market decline.

On May 7, we contacted over 250 firms to determine the impact of the market disruption to the firms and their customers. Our inquiries covered a range of issues depending on the type of firm, including funding and liquidity, customer exposure, increased margin calls, net capital implications and how firms intended to reestablish limit orders that were executed and then canceled. We followed up with particular firms last week to ensure that appropriate steps had been taken to address any issues identified in our initial discussions. While firms cited a number of operational and other issues, none appeared to be systemic in nature. In addition, we are examining the flow of customer complaints to both us and the firms concerning order handling and execution practices during the market decline.

We have focused our review of the vast amounts of trading data on the approximately 300 stocks that experienced the most dramatic decline during the 30-minute period in question. That list, unsurprisingly, coincides with the list of securities that were the subject of cancellations and reversals by the markets on the evening of May 6. We continue to review order entry and trade reporting data for the 300-plus stocks, and have identified a subset of these stocks for further inquiry, based on an analysis of a concentration of order and trade activity in the period immediately prior to and during the market drop. Focusing on the selling activity in these securities (some of which, incidentally, are exchange-traded funds), we, again working closely with both SEC staff and staff from the other markets, contacted those firms that were most active. Our lines of inquiry, while quite broad, include an analysis of short selling during the period and the role that algorithms played, including the specific strategies and triggers employed by the trading firms. Finally, we are talking to the largest broker-dealer alternative trading systems to determine whether they had system issues that may have contributed to the market drop.

While there is still much to be done before we can say that we have definitively pinpointed the cause or causes of the decline, I think we can say that certain basic truths have emerged, and that we should not wait to adapt to them. First, we know that the process for restoring order following an event like last Thursday should be more transparent and predictable.

Second, this event demonstrated that the conventional wisdom that the futures markets tend to move first continues to hold, as does the notion that the market is highly efficient in shifting that momentum from the derivatives side to the cash side, creating fast and focused selling pressure across wide numbers of stocks and ETFs. That point, that the equities markets can find themselves dramatically influenced by external market movements, now has a clear corollary completely self-contained in the equities space.

Specifically, as we've seen exchange barriers to entry drop, competition rise and market structure policy compel connectivity among exchanges and between exchanges and other execution venues, we see that market quality can no longer be ensured by a single exchange acting in a siloed fashion. Moreover, while the market fragmentation that has occurred has lowered barriers to entry and created fierce competition resulting in narrow quotation spreads and a high level of liquidity in good times, it also results in the fact electronic removal of liquidity when markets are stressed. It also generally resulted in the elimination, in many cases, of meaningful market maker obligations while retaining residual regulatory requirements for two-sided quotes that has led to the "stub quoting" phenomenon that contributed to the extreme price volatility. In short, while our equity market structure performs well under normal conditions, change is urgently needed to better address these flash market break situations.

Taking note of that last point, FINRA was pleased to have participated in a series of discussions with the U.S. equities and options exchanges, at the direction of the SEC, to establish a framework for market-wide, stock-by-stock circuit-breaker rules and protocols. The result of this coordinated effort are the rule changes filed on Tuesday by each of the exchanges and FINRA to implement the following stock-by-stock circuit-breaker protocols on a pilot basis for all securities included in the S&P 500:

- If the price of a security changes by 10 percent within a rolling 5-minute period, trading in that security will be halted for 5 minutes.
- A message will be sent simultaneously to all the markets and FINRA.
- The primary market for the security will employ its standard auction process to determine the opening print after the 5-minute halt period.
- The authority will apply from 9:45 a.m. to 3:35 p.m., Eastern Time.

This solution will allow a pause in trading that will allow market participants to better evaluate the trading that has occurred to correct any erroneous "fat finger" orders and to allow a more transparent, organized opportunity to offset the order imbalances that have caused the volatility. In this way, this regulatory response should reduce the negative impacts of sudden, unanticipated and otherwise unexplained dramatic price movements in individual securities. This is far preferable to the markets having to be in the position of going back after the fact to determine what trades should be broken when markets go close to zero.

Additional implementation and technological issues will be discussed and resolved by the relevant markets in the coming weeks, with the goal of implementing the new circuit-breaker authority within 30 days after Commission approval. Once implemented, the markets and FINRA will be monitoring continuously the application and effectiveness of the rule's framework and protocols to determine the most efficient and effective permanent approach, in anticipation of such authority being expanded to a broader range of securities.

Next Steps

As we look past these shorter term steps to address what we saw in the market 2 weeks ago, longer term concerns must also be addressed if we are to reassure market participants, including retail investors, that our equities markets are stable and fair. And this is true irrespective of whether these issues played a major contributing role in the specifics of the decline on May 6.

First, firms need to ensure that they do not continuously feed in orders once markets have broken with respect to precipitous declines.

Second, firms must properly supervise customers to whom they have given "direct access" to the markets, thereby allowing a customer to trade on an exchange using the firm's market participant identification code. Any firm that provides its name to and/or sponsors a transaction has a responsibility to ensure the proper reviews for those transactions are in place.

Third, there should be a continued analysis of various markets' rules regarding circuit breakers and clearly erroneous trades, with an eye toward consistency and transparency of these rules across markets. As Chairman Schapiro has said, "the primary objective should be a market structure that minimizes to the greatest ex-

tent possible any need to correct erroneous trades. When necessary, however, the process should be applied in a consistent manner under established rules that are fair to investors." I also agree with Chairman Schapiro that the practice of displaying stub quotes should be analyzed and potentially eliminated.

Finally, and most broadly, the events of May 6 demonstrate the vital importance of the SEC's current review of market structure, rule proposals on direct market access and large trader reporting, and the forthcoming proposal related to establishing a consolidated audit trail.

Market Structure Review and the Need for a Consolidated Audit Trail

The sometimes dizzying speed of change in the markets, which puts a premium on innovation and competition, has made it imperative that regulators act now to close regulatory gaps that ineffectively discourage illicit activity in the shadows. The lag between market innovation and regulation is particularly pronounced in the increasingly fragmented area of equity trading. There, we have seen a rapid evolution of how and where trading occurs, and how quickly—and transparently—it is executed. High-frequency trading, dark pools and direct access are now commonplace, compelling regulators to adapt to ensure that market participants play by the rules.

A generation ago, the vast majority of activity occurred on the equity market that listed the security. Today, orders are routed to some 50 competing platforms. This complex environment creates opportunities for traders seeking unfair advantage to manipulate markets. How? By exploiting inconsistencies or gaps created when the responsibility of regulatory oversight is divided. Regulatory gaps and splintered oversight make it possible for trading abuses—such as market manipulation, marking the close and front-running customer orders—to be carried out furtively across multiple markets, with a reduced chance of detection.

By spreading trading activity across different market centers, firms can attempt to disguise abusive trading activity by exploiting the existing gaps in audit trail data. Although regulatory authorities currently examine for, investigate and prosecute abusive trading activity when it violates existing regulatory obligations, we are hampered by the lack of a comprehensive, sufficiently granular and robust consolidated audit trail across the equity markets. The most effective way to surveil for these trading practices across the wide range of market centers is to consolidate audit trail data in a single place so that violative trading practices can be more readily identified.

Each market is required to have in place rules that, among other things, seek to prevent fraudulent and manipulative acts and practices, and protect investors and the public interest. Although each market is responsible for regulating and surveilling the trading conducted on its market, as markets become increasingly fragmented and securities trade on multiple venues, regulation of activity that crosses markets becomes a vital component of ensuring overall market integrity and maintaining investor confidence. This is particularly so because trading abuses such as insider trading, market manipulation, marking the close and trading ahead of customer orders so easily can be conducted across multiple markets. FINRA believes that a consolidated audit trail across markets, and eventually across investment products, is essential to ensure comprehensive surveillance of the equity markets and related markets so that abusive trading activity can be detected in a more timely, efficient and comprehensive manner.

Today, regulation of the equity markets is split among FINRA and other SROs, and no single regulator has a full picture of all trading activity in the U.S. equity markets, either on a product-specific, firm-specific or, under certain circumstances, even an order-specific basis.

The announcement on May 4 that FINRA will assume market regulation for NYSE Euronext's U.S. platforms is a major step toward establishing such a unified approach to market oversight. Under the plan, FINRA—which already conducts market surveillance for the NASDAQ Stock Market and trading occurring off-exchange—will be responsible for aggregating and regulating approximately 80 percent of trades in equities made at U.S. market centers. The benefits for market integrity and investor protection are profound. But perhaps more importantly, empowering a single set of eyes to oversee the majority of transactions will facilitate the necessary progress toward a truly holistic approach to regulation that addresses the realities of today's marketplace.

Quite simply, technological advances in trading systems, coupled with market fragmentation, have led to a situation where comprehensive intermarket surveillance is essential to ensuring the overall integrity of the equity markets. Moreover, the major hurdles of just a few years ago to consolidated market surveillance have been significantly reduced due to the progression of market structure and the convergence of many aspects of exchanges' business models. With the changes to mar-

ket structure resulting from Regulation NMS and virtually all aspects of trading becoming electronic, the previous distinctions between market types are quickly fading away, minimizing many of the prior obstacles to consolidated audit trail data and oversight.

Since the adoption of Regulation NMS in 2005, there has been a significant increase in market linkages, the result of which is that trading activity that originates on one market often has a profound effect on other markets. This, of course, creates a much greater possibility of cross-exchange market manipulation where, for example, trading on one market is used to artificially affect a security's price and trading on another market is used to take advantage of that price change. A similar problem exists when surveilling for compliance with rules that prohibit firms from trading ahead of a customer order, such as limit order protection rules and front running rules. In these cases, the proprietary trading may be executed on one market while the customer trade is executed on another. These problems are exacerbated by the fact that some firms trade using multiple market participant identifiers (MPIDs) or trade pursuant to market access arrangements whereby the firm's trading is identified with an MPID assigned to a different firm.

FINRA believes there should be consistent and uniform gathering of order, trade and quote information across all equity and options markets, and that the audit trail must be sufficiently granular to enable regulators to readily identify trading activity by market participants across markets. A consolidated audit trail would not eliminate all the challenges of analyzing the data from a 66 million trade day like May 6, but it would make the process significantly more efficient and effective.

We look forward to working with the SEC, and with this Committee, as we continue our work on these important initiatives that lie at the heart of enhancing regulators' ability to best oversee today's markets.

Conclusion

We will continue to work with our fellow regulators to diagnose and identify corrective measures to address the significant market disruption 2 weeks ago. The SEC and CFTC spearheaded a process that has resulted in a coordinated, market-wide proposal that will quickly and dramatically lessen the chances for an event like that we saw May 6. But the effort is far from over.

Further analysis of rule changes, highlighted by both the market drop and the SEC's current market structure review, can and will strengthen our system to further ensure that rules and regulators are best positioned to ensure the continued integrity of U.S. markets and to protect all investors who participate in those markets.

Again, I appreciate the opportunity to share our views. I would be happy to answer any questions you may have.

PREPARED STATEMENT OF LARRY LEIBOWITZ

CHIEF OPERATING OFFICER, NYSE EURONEXT

MAY 20, 2010

Introduction

Chairman Reed, Ranking Member Bunning and Members of the Subcommittee, my name is Larry Leibowitz and I am Chief Operating Officer for NYSE Euronext.[1] I appreciate the opportunity to share with the Subcommittee our written testimony on the subject of today's hearing.

We commend the Subcommittee for its proactive response to the trading events of May 6, 2010. We agree with the Subcommittee that an orderly trading environment is fundamental to ensuring the reliability and integrity of our financial markets, fostering investor confidence in the markets, and safeguarding the U.S. financial system and economy. NYSE Euronext has always worked and will continue to

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[1] NYSE Euronext is a leading global operator of financial markets and provider of innovative trading technologies. The company operates cash equities exchanges in five countries and derivatives exchanges in Europe and the United States, on which investors trade equities, futures, options, fixed-income and exchange-traded products. With more than 8,000 listed issues, NYSE Euronext's equities markets—the New York Stock Exchange, NYSE Euronext, NYSE Amex, and NYSE Arca—represent nearly 40 percent of the world's equities trading, the most liquidity of any global exchange group. NYSE Euronext also operates NYSE Liffe, the leading European derivatives business, and NYSE Liffe U.S., a new U.S. futures exchange. We provide technology to more than a dozen cash and derivatives exchanges throughout the world. The company also offers comprehensive commercial technology, connectivity and market data products and services through NYSE Technologies.

strive to be the standard for accountability and transparency in the regulated marketplace. Thus, we believe it is essential to carefully examine the market events that occurred on May 6, 2010 and to consider potential market design and regulatory actions that could mitigate any similar occurrences in the future. NYSE Euronext is firmly committed to working with regulators and market participants toward achieving this critical objective, and we strongly urge all parties to play an active and responsible role in helping our market function in a way that gives investors confidence. The trading events of May 6 are indicative of broader changes to markets and trading practices for which recent advances in technology have been a catalyst, and which the SEC wisely has opened for review. We particularly applaud the extraordinary effort and professional dedication of the SEC and CFTC in producing a thoughtful preliminary report on the events of May 6th in such a short timeframe.

Today I would like to discuss:

- the trading events of May 6, 2010;
- the role automated trading and high frequency trading played in the market disturbance;
- the actions, and rationale behind those actions, that the New York Stock Exchange took during those events; and
- our recommendations for market design and regulatory changes to avoid similar events and enhance investor safeguards in the future.

The May 6, 2010 Market Drop

On May 6, 2010, from 2:40 p.m. to 3 p.m. Eastern time, the U.S. equity trading markets experienced a precipitous decline. At its lowest point, the Dow Jones Industrial Average suffered an intraday decline of 998.5 points, representing approximately $1 trillion in market value, with the most severe trading pressure occurring between 2:40 p.m. and 3 p.m. Some individual stocks lost nearly 100 percent of their market value. Although some of the underlying economic and global financial conditions that influenced this selling activity are known, the exact succession of events and what precipitated them remain unclear. The Securities and Exchange Commission (the "SEC") and the Commodity Future Trading Commission (the "CFTC") are aggregating and analyzing trading data from all of the equity and derivatives markets and, in addition to their preliminary findings issued on May 18, 2010, will form a complete picture of the situation. We and other markets are working with the SEC and CFTC to supply and interpret this data, but we cannot do so on our own, as any single exchange has access only to the data from trades sent to or executed on that exchange.

From our standpoint, we see no evidence of fat finger error or market manipulation, due to automated trading or otherwise. However, we do see the following:

- Elevated market activity coming from adverse European news, including a very large and a broadly based wave of orders and quotes at around 2:30 p.m.;
- A significant reduction in marketplace liquidity as measured by the size of order books through the day, which accelerated dramatically through the downturn;
- Increased downward pressure exacerbated by the triggering of retail Stop Loss orders, which sent market sell orders into an already weak market; and
- Various microstructure issues that resulted in certain marketplaces not interacting with one another, which exacerbated the liquidity effect.

Trading activity like we experienced on May 6 underscores the importance of the broad market structure review that the SEC is undertaking at present. As you know, in 2005 the SEC adopted Regulation NMS, which is the main set of regulations that govern the interaction of the competing markets in equity securities. Regulation NMS has resulted in a number of benefits to the equity markets, including narrower spreads and a greater use of technology, positioning the equity markets to handle the extreme market stresses that began in the fall of 2008. Additionally, Regulation NMS resulted in vibrant competition in the markets. We strongly support competition in the equity markets, but competition among trading centers and models has also resulted in significant market fragmentation. There are currently upwards of 40 market centers in the equities markets, including registered exchanges and alternative trading systems.

Moreover, the broader market structure has evolved to one that values speed over most other factors, while on the New York Stock Exchange we have put a special emphasis on arriving at the right price. When a trading problem occurs, such as the May 6 experience, there is no central mechanism to coordinate a market-wide

response, or better yet to briefly pause, reassess what is happening in the marketplace and re-aggregate liquidity for the express purpose of conducting price discovery. Exchanges have rules for trading halts regarding pending news and trading problems and also have had to implement rules to address erroneous trades, most of which would not occur in a well functioning market structure. And while the securities and futures exchanges, along with the Financial Industry Regulatory Authority (FINRA), have adopted the market-wide circuit breakers developed after the 1987 market crash, there were no pre-established mechanisms in place on May 6 to address precipitous declines on a stock-by-stock basis, or trading problems that result in market-wide drops of less than 10 percent.

We are confident that the May 6 market drop will inform the SEC's current examination of the changes in the markets, and in particular how certain recent advances in technology may have fostered trading practices that negatively impact the entire market, and how practices that in the past were considered standard do not function well in today's market. We are committed to working with the SEC and the CFTC as they consider these important issues.

It is worth noting that a theme in some responses to the outstanding SEC market structure review is that policymakers should refrain from tinkering with the equity capital markets because they operate smoothly and efficiently, with deep liquidity and narrow spreads. While we do not disagree with many of these observations on the whole, we believe May 6th highlights why we do in fact need to focus on new rules and frameworks to avoid potential issues that arise in our fragmented marketplace, in a manner that is sensitive to maintaining an innovative environment. At the same time, we do not think it is right to point blame at professional traders or one category of liquidity providers, but rather believe that events of May 6 further highlight some of the issues raised in the SEC's Concept Release regarding market maker commitments to the marketplace, dark liquidity and overall transparency.

In this regard, I want to say a few words about high frequency trading. One of the challenges in addressing the topic is that there is no accepted definition of high frequency trading, but for present purposes I use the term to refer to a variety of high-speed techniques that have effectively filled the void left by human market makers who could no longer compete when decimalization greatly shrunk spreads.

The New York Stock Exchange Euronext believes that high frequency trading adds liquidity to the markets, to the benefit of investors. It is most common in high-volume stocks and research demonstrates that since 2002, quoted spreads between bid and offer on stocks have tightened the most in high volume stocks compared to lower volume ones, presumably showing the benefits of high frequency trading. Moreover, the New York Stock Exchange Supplemental Liquidity Provider (SLP) program gives high frequency traders an economic incentive to quote at the best price a certain percentage of the time, thus rewarding the provision of liquidity.

I want to be clear that the New York Stock Exchange Euronext does not favor high frequency trading or any other type of strategy over others. Rather, our role is to provide liquid, transparent and well-regulated exchanges, and let customers choose how they wish to access our markets.

Before describing our actions on May 6, I believe it would be useful to explain the rules of the New York Stock Exchange that are designed to mitigate volatility which arises out of brief bursts of liquidity demand.

The New York Stock Exchange's Market Model

The New York Stock Exchange has embraced electronic trading, and we believe our market model provides the best combination of cutting-edge technology and human judgment. The New York Stock Exchange market rules expressly provide mechanisms to mitigate volatility and large price swings—which we have always believed is a critical piece of our offering to listed companies and their investors.

Specifically, the hybrid design of the New York Stock Exchange incorporates in its trading structure a type of circuit breaker mechanism, known as Liquidity Replenishment Points ("LRPs"), which temporarily and automatically pause trading in stocks when significant price moves occur. The LRPs are triggered by specific criteria based on the prices of particular stocks, which criteria are included in our rule book and were approved by the SEC. On a typical day, LRPs are triggered a few hundred times, lasting for seconds at most, and served the market well during the recent financial crisis.

LRPs are designed to allow pauses and judgment to supplement artificial intelligence when trading appears irrational. The New York Stock Exchange's human liquidity providers absorb the news and trading patterns with respect to individual stocks and can conduct auctions of order imbalances. To be clear, the LRP mechanism does not halt trading and does not allow liquidity providers to Written State-

ment of Larry Leibowitz, step away from the market. Instead, for a short time, trading is automatically paused to facilitate more accurate price discovery, mitigate confusion and reduce panic, and prevent the market from experiencing a sudden and significant move. During this pause our quote is visible to other market participants and new orders are accepted. Our LRPs are analogous to taking the controls of a plane off autopilot during turbulence.

Necessarily, and beneficially, this process is more deliberate and time consuming than fully electronic trading. Although Regulation NMS permits electronic trading to ignore the New York Stock Exchange when we are in our circuit-breaker mode, many market participants specifically chose our mode of trading in this time of stress: during the 20-minute period of focus on May 6, including the periods when the New York Stock Exchange was in LRP mode, market share on the New York Stock Exchange was 5 percentages points higher than usual during that time of day, and the participation rate of our Designated Market Makers (formerly known as Specialists) and Supplemental Liquidity Providers was actually higher than usual. This is evidence that our liquidity providers did not walk away from the market as we actively traded during the downturn.

Once the New York Stock Exchange's circuit breakers were triggered, prices on the New York Stock Exchange were dramatically different from prices on electronic exchanges that did not have in place a similar circuit breaker mechanism. Because the New York Stock Exchange had switched to LRPs, and because Regulation NMS allows traders to bypass us, orders were routed to electronic markets that had not mitigated the volatile price declines and which had limited amounts of liquidity on their books.

To demonstrate that LRPs protected orders in our market, stocks listed on other markets had price declines and erroneous executions far greater than stocks listed on the New York Stock Exchange. For instance, while Proctor and Gamble traded no lower than $56.00 on the New York Stock Exchange during the 20-minute period of focus, it traded as low as $39.37 on electronic exchanges. In terms of erroneous executions, the overall marketplace needed to cancel approximately 15,000 executions after Thursday's decline. On the New York Stock Exchange—even though we handled the largest share of orders in the marketplace—*we had to cancel ZERO trades* because of the protective measures in our market—while still trading more shares than any other venue. In fact, 85 percent of the trades that ultimately were canceled were securities that were not listed on the New York Stock Exchange.

I emphasize these points to dispute the notion that the New York Stock Exchange stepped away from the marketplace during this crisis.

We should note that LRPs are not intended to prevent the market from falling; indeed that is not the role of an exchange, and could not be achieved by any one market. Rather, our LRPs are designed to protect the integrity of our market by preventing a panic-led downdraft and mitigating systemic risk. Yet, when we are in this "slow" mode, other electronic markets may choose to ignore our quotes, as permitted under Regulation NMS. Thus, a circuit breaker on a single trading market, such as the New York Stock Exchange, is not able to staunch volatile and panicked trading on other markets especially if those markets choose not to participate in our circuit-breaker mechanisms.

The bottom line is that while there is always room to improve LRPs and other such mechanisms, these actually worked well on May 6th. However, the mechanism is only truly effective if observed by other trading venues, and that's why Chairman Schapiro's plan for an industry-wide trading circuit breaker is needed.

Recommendations

One clear lesson of May 6 is that our markets need a predictable, preestablished, coordinated way to respond to extreme and rapid market volatility. The LRP system has worked, but market-wide circuit breakers are necessary and will be even more effective. The listing and trading venues, under the SEC's guidance, have filed proposals to adopt stock-level circuit breakers to pause trading when the price of a security has changed by 10 percent in a 5-minute period. Once circuit breakers have been triggered in a security, they will apply to all trading in the security, wherever it takes place, with the decision to invoke and reopen governed by the primary listing market. In this regard, we would also highlight the order protection rules under Regulation NMS. The original intent of the rule may have been to give automated markets the option of bypassing a market that was temporarily operating in a manual mode. In practice, however, the ability of markets to bypass a manual market by default resulted in a situation where markets effectively chose to ignore and trade around our quotes once our Written Statement of Larry circuit breakers were triggered. While we feel the LRPs helped the market overall on May 6th and certainly did not exacerbate the problems, most of the benefit accrued to orders on the

NYSE marketplace, and the events of May 6 have demonstrated that it may be time to reconsider routing practices that trade through functioning quotes as a default matter.

Second, the current market-wide circuit breakers were established long ago and are based on market moves of 10 percent, twenty percent and thirty percent. There has not been a move greater than 10 percent in a single day post-2000. These levels should be tightened, and the circuit breaker should be based on a broader index rather than a narrow Dow Jones index.

Third, the rules on cancellation of trades should be further defined. On May 6, it was announced after markets closed that any trades executed at 60 percent above or below the last price at 2:40 p.m. would be canceled. This action was not predictable and caused confusion in the markets. We are working with regulators and other exchanges to establish clear cancellation rules for the future, which set thresholds and circumstances under which trades will be canceled or adjusted, to correct errors rather than market-wide movements.

Fourth, brokers should review their order routing practices to ensure they are truly getting the best prices for their clients, and also see whether allowing market orders and Stop Loss orders really service the investing public, or whether there are things we can jointly do to educate and protect retail investors from being the victims of volatile markets.

Fifth, to facilitate a review of extraordinary trading events, there should be a consolidated audit trail that would allow regulators to easily review market-wide trade data. Having such a mechanism in place very likely would have aided the review of the May 6 events. We understand the SEC is developing such a proposal, and we are committed to assisting in that effort.

We also note that the SEC has recently proposed regulations that would govern the risk controls applicable to providers of market access, to provide more transparency to the equities markets more broadly, and more generally review the functioning of the equities markets, and we have expressed our support for many of these proposals. In order to both avoid similar trading events and to facilitate surveillance, there should be uniform standards across markets that govern the risk controls and procedures that market access providers are required to implement. In addition, the SEC has proposed rules to gather information from large traders. These proposals may address some of the problems associated with aggregating and reviewing trading activity.

Ultimately, these and other important actions may best be achieved by consolidating market surveillance in one securities self-regulator—probably FINRA, which would require an act of Congress. We also need to ensure both the SEC and FINRA have the funding required to perform these duties.

Finally, the SEC should continue its broad-based market review to help find ways to improve our current market structure.

Conclusion

The events of May 6, 2010 demonstrate that the markets would benefit from a comprehensive structural review of the rapid advances in technology and their effect on trading practices and market integrity. As you know, the SEC has already commenced such a review, issued several rule proposals and has indicated that other proposals are forthcoming. We are committed to working with the SEC in these initiatives, and we strongly urge all parties to play an active and responsible role in helping our market function in a way that gives investors confidence. In addition, we applaud the SEC and the CFTC for working together to review the events that transpired on May 6, their extraordinary effort in producing their May 18, 2010 preliminary findings, and their continued work to develop a coordinated solution to prevent a recurrence of those events.

Once again, thank you for the opportunity to appear before the Subcommittee. I would be happy to answer any questions you have.

PREPARED STATEMENT OF ERIC NOLL

EXECUTIVE VICE PRESIDENT, THE NASDAQ OMX GROUP, INC.

MAY 20, 2010

Good afternoon Chairman Reed, Ranking Member Bunning and Subcommittee members. Thank you for offering the NASDAQ OMX Group, Inc. the opportunity to share our perspective on the events of May 6th. As Executive Vice President of NASDAQ U.S. Transaction Services, I have responsibility for trading of equities and options on the NASDAQ Stock Market, as well as trading on NASDAQ's markets in Philadelphia and Boston, NASDAQ OMX PHLX and NASDAQ OMX BX.

NASDAQ understands the critical role of capital markets in the U.S. economy and the obligations of all national markets to protect U.S. investors. We have studied the events of May 6th and what they suggest about the current operation of the U.S. equities markets. It is important to learn the lessons that are available from May 6th and to prevent a repeat of those events.

To accomplish that, we have worked closely with the Securities and Exchange Commission, the CFTC, the New York Stock Exchange, and other national securities exchanges to protect investors. We have met with senior officials and staff at the SEC to identify opportunities to improve regulation and to develop a coordinated strategy to combat market instability. We support the Commission's and the CFTC's actions in four areas:

(1) Updating existing market-wide circuit breakers to include tighter parameters and a broader index reference point;

(2) Establishing new stock-by-stock circuit breakers that include an element of "velocity" or rapidity of price changes,

(3) Improving the handling of trade breaks during unusual market events to maximize consistency and rationalize moral hazard; and

(4) Changing the use of quotes and specific order types that impacted trading on May 6th.

The focus of these changes is consistency. While each individual exchange reports that its systems functioned according to design on May 6th, the changes currently being considered will improve the markets' collective ability to handle unusual trading events in the future and help to restore investor confidence in the safety of U.S. markets. Markets like consistency and predictability; they abhor uncertainty.

We believe NASDAQ is qualified to assist the Commission at times of market stress. We are the world's largest exchange company. We list over 3,700 public companies, operate 22 markets and 10 clearinghouses worldwide, provide technology to over 70 exchanges, clearing organizations and central securities depositories in over 50 countries, and regulate the trading and clearing of equities, options, commodities, and derivatives across the globe. We understand the role we play in serving and protecting millions of investors in the United States and around the world that rely on the safety and predictability of our markets to grow their savings and safeguard their futures.

U.S. capital markets are the deepest, fairest, most effective markets in the world. Our cash equities markets have been and remain the engine of sustainable economic growth, allowing U.S. companies to raise trillions of dollars in capital, create millions of jobs, and spur new industries around the globe. Cash equities markets functioned without interruption during the financial meltdown of 2008 and 2009, unlike the credit and derivatives markets. Our markets are strong, despite the seventeen minutes of unusual trading that occurred between 2:39 and 2:56 p.m. on May 6th. In fact, the markets' rapid recovery that day confirms that our markets are resilient and strong even under extraordinary strain.

We have been studying and will continue to study the data and behaviors recorded on May 6th. To understand fully the events of May 6th, it is important to understand the information the markets were trying to process. Markets were nervous. Equity markets had experienced an unusually long and large upward price movement, with the NASDAQ Composite Index nearly doubling between March 9, 2009 and April 26, 2010. Market analysts will tell you that following such gains, it is not unusual for markets to experience a price correction.

Markets were becoming increasingly volatile. NASDAQ monitors the CBOE Volatility Index or VIX, which measures the implied volatility of the S&P 500 expected over the next 30 days. The VIX generally measures below 20. It rose during the financial crisis, reached a high of 89 on October 24, 2008, and then gradually declined throughout 2009 and early 2010. From February 26, 2010 through April 26, 2010, the VIX continuously stayed below 20, dropping below 16 on April 12th and April 20th. Volatility returned on April 27th, when the VIX once again broke above 20 and began rising steadily. By May 5th the VIX reached the upper 20s, and on May 6th and 7th it closed above 30.

This increased volatility was tied to the escalating financial crisis in Greece and the Eurozone. Although the issues in Greece had been developing for several months, the potential harm seemed to sink in to U.S. markets only within the week prior to May 6th. Credit ratings agencies had just lowered their rating of the sovereign debt of Greece, Spain and Portugal, roiling sovereign debt markets; the European Union and International Monetary Fund were working to fashion workable bailouts; and social tensions and violence escalated in Athens. The Euro had lost

15 percent of its value in the last 6 months, including 7 percent in the prior 2 weeks alone.

Against this backdrop, we experienced a unique confluence of events beginning at 2:35 p.m. on the afternoon of May 6th. First, the Dow Jones Industrial Average was already trading off 272 points for the day and 500 points in the previous 3 days. Market conditions were already volatile.

Second, the Chicago Mercantile Exchange received an unusually large institutional order to sell futures tied to the S&P 500 Index. Futures are a forward indicator for prices of equities and options that are also tied to the S&P 500 Index. Thus, when S&P futures prices begin sinking rapidly at 2:42, this was followed closely by rapid price declines in S&P-linked equities. At 2:45:30, S&P futures trading became so negative that the Chicago Mercantile Exchange triggered a "Stop Price Logic Event" that caused an automatic 5-second pause in S&P futures trading to collect liquidity. Given CME's near-100 percent market share in S&P futures, the Stop Price Logic Event was, effectively, a market-wide halt. When trading resumed, futures prices immediately leveled off and began to climb rapidly. Shortly after, equities prices also rose rapidly. After a thorough review, the CME has announced that its systems functioned properly that day and that there was no evidence of wrongdoing or clear errors by CME or CME members.

Third, the NYSE Arca Exchange, the all-electronic market operated by NYSE, began experiencing data communication issues that hindered the electronic linkages between it and NASDAQ, the BATS Exchange, and the Chicago Board Options Exchange. When Arca became unable to communicate properly, this signaled other markets to stop sending orders to it. This is exactly what happened; NASDAQ, BATS and CBOE each stopped sending orders to Arca at a critical point in time. Again there is no evidence of inappropriate activity at Arca. Nevertheless, its liquidity became less unavailable at a critical time.

Fourth, simultaneous with events at NYSE's electronic Arca exchange, the NYSE hybrid market began reporting multiple "Liquidity Replenishing Points" and "gap quotes" that impacted the trading of individual S&P stocks in the NYSE market. Under SEC Regulation NMS, the NYSE is permitted to issue LRPs and gap quotes. What this did, in our view, was to signal other markets that NYSE was experiencing order imbalances or other difficulties. This, in turn, signaled that other markets may stop routing orders to NYSE and trade at other markets instead. This is exactly what happened; NASDAQ and other markets stopped routing orders to NYSE. Even Arca, NYSE's own all-electronic market, stopped routing orders to NYSE. NYSE was the only market to issue LRPs or gap quotes on May 6th.

This confluence of events caused a rapid drop in the markets. From 2:39 to 2:47 p.m. the Dow dropped 723 points to 9869, its low for the day and down 995 points total from the prior close. From 2:47 to 2:56 the Dow recovered just as rapidly, risings 612 points from 9862 to 9974, down 387 points for the day. From 2:56 p.m. to the close the Dow rose another 45 points, ending the day down 342 points.

How should we respond to these events? As you know, the markets and market participants are subject to multiple layers of regulation; the Securities and Exchange Commission oversees trading and markets, including regular and special examinations of markets and market participants. There was in place a market-wide circuit breaker that limits aggregate movement of market indices, but it was not triggered. NASDAQ and other markets have "collars" that limit the impact of individual market orders, but there were limited numbers of market orders entered that day. Members have obligations to have procedures, controls, and systems in place to limit aberrant trading and control risk. The Financial Industry Regulatory Authority, acting as NASDAQ's agent, examines firms to ensure that those procedures, controls, and systems are in place and effective. Should these safeguards have prevented the rapid decline and recovery in the markets on May 6th? We have already begun to re-examine each of these safeguards in light of those events.

From a systems standpoint, NASDAQ's market operated continuously throughout the day and throughout the critical seventeen minutes. Each and every one of NASDAQ's electronic systems functioned as designed and as intended. Its execution engine, market data feeds, and surveillance systems all functioned as designed. Each exchange is reporting that its individual systems functioned as designed. That said, no market center or regulator can be satisfied with the collective performance of the markets on May 6th. As discussed earlier, the Commission and the exchanges are developing coordinated strategies to improve the exchanges' collective ability to respond to unusual trading events.

What did NASDAQ See and Do? NASDAQ operates one of the most heavily monitored exchanges in the world. NASDAQ's MarketWatch and Trading Operations departments monitor our equities markets from 6:30 a.m. to 8 p.m. using sophisticated technology that looks for trading anomalies, market rumors and manipu-

lations. These departments process 17,000 phone calls in the average month and MarketWatch reviews more than 50,000 issuer press releases in the average year.

At 2:23pm NASDAQ's automated surveillance systems began issuing alerts in multiple securities exhibiting unusual price movements. In response to the alerts, NASDAQ's regulatory staff in the MarketWatch and Trading Operations departments began reviewing trading activity. NASDAQ's MarketWatch group uses high speed technology to oversee trading in the NASDAQ equity venues. On average the MarketWatch's surveillance system processes 1.9 billion equity related messages a day. On May 6 there was a large spike in surveillance alerts generated that coincided with the largest drops in the Dow Jones Industrial Average.

At 2:30 p.m. the Chicago Board Options Exchange issued a communication stating "The CBOE has declared Self Help against NYSE/ARCA as of 1:30 CT. The NYSE/ARCA is out of NBBO and unavailable for linkage. All CBOE systems are running normally." Under SEC Rule 611 under Regulation NMS, CBOE's announcement signaled that CBOE had stopped attempting to trade with NYSE's all-electronic Arca exchange pending renewed communication from that exchange

At 2:36:59 NASDAQ systems also detected a data disruption at NYSE Arca and NASDAQ also declared "Self Help" against that exchange. At 2:42 p.m., NASDAQ published a "System Status" update on its member website stating "NASDAQ has declared Self Help against NYSE ARCA (ARCA) as/of 14:36:59 E.T. All NASDAQ systems are operating normally."

At 2:43 p.m. NASDAQ issued another System Status update stating that NASDAQ OMX BX had also declared Self Help against NYSE Arca as of 14:38:40. All NASDAQ systems were operating normally.

At 2:45:30, trading in E–Mini futures became so volatile and negative that the Chicago Mercantile Exchange triggered an automatic 5-second pause in E–Mini futures trades.

At 2:48 p.m., NASDAQ MarketWatch communicated with NYSE Arca's regulatory staff about regulatory alerts being generated by NASDAQ's market surveillance systems. NYSE Arca staff confirmed that they also had detected unusual trading activity. Neither market had received any communication from members regarding system malfunctions or errant orders that might have contributed to price movements.

At 2:49 p.m. the BATS Exchange declared Self-Help against the NYSE Arca Exchange. As of 2:49 p.m. four markets had declared Self-Help against NYSE's all-electronic Arca exchange.

At 3:00 p.m., NASDAQ staff opened an internal call including key NASDAQ personnel from multiple departments. NASDAQ uses this procedure where necessary to gather knowledge quickly and to respond effectively to unusual trading activity. The call lasted until nearly 1:00 a.m. the following morning.

At 3:16 p.m. NASDAQ took the lead and initiated a market-wide call for the entire national market system. The triggering of a market-wide call is designed to establish communication and ensure coordination among exchanges that trade the same securities. It has become a critical procedure for exchanges to manage events such as this that involve cross-market trading activity. At 3:56 p.m. observers from the SEC's MarketWatch and Trading and Markets staff joined the market-wide call initiated by NASDAQ.

At this point, NASDAQ began focusing communication on the identification and treatment of "clearly erroneous trades", those trades that might be broken or unwound as a result of the market events. NASDAQ issued the following System Status update on its website at 3:37 p.m. "NASDAQ is currently working with other markets to review the broad market activity that occurred between 2:00 and 3:00 p.m. today. NASDAQ will advise when more information is known."

At approximately 4:00 p.m. the markets jointly determined to review and potentially break trades that occurred between 2:40 and 3:00 p.m. The markets briefly considered breaking trades executed between 2:30 p.m. and 3:00 p.m. but they then decided collectively upon the 2:40 p.m. start time instead. Trades outside this period were still eligible for review by individual exchanges under their own authority. At 4:24 p.m. NASDAQ issued another System Status update announcing the decision to review trades that occurred between 2:40 and 3:00 p.m.

After jointly determining which trades to review, the markets jointly continued to discuss which trades to break. There was debate among the exchanges regarding the proper break point for trades executed between 2:40 and 3:00 p.m. After extended discussion, the exchanges each agreed on a joint market ruling to cancel trades during the review period that deviated by greater than 60 percent from the consolidated last sale price in that security at 14:40 or immediately prior. Each exchange communicated this information to its members; NASDAQ announced the decision to its members via a System Status update published at 6:03 p.m.

NASDAQ staff continued reviewing trades until after midnight on May 7th. NASDAQ regularly communicated rulings to its members by issuing System Status updates at 8:24 p.m., and 12:25 a.m. Additionally, at 8:28 p.m. NASDAQ issued a press release describing the market events and the decision of all markets jointly to break trades. It is important that trades be broken quickly, if at all, to avoid negative impact on clearing and settlement.

Multiple equities and options exchanges broke trades executed between 2:40 and 3:00 p.m. on May 6th. In addition to over-the-counter trades broken by FINRA, and trades broken by the BATS Exchange, NYSE's electronic Arca exchange broke over 4,000 trades, and NASDAQ broke over 10,400 trades representing 1,410,692 shares in 236 unique securities. To put this into perspective, from 2:40 to 3:00 p.m., NASDAQ executed over 2.4 million trades representing over 500 million shares traded. In other words, NASDAQ broke less than one half of 1 percent of trades and roughly one-quarter of 1 percent of shares executed during the 20-minute period from 2:40 to 3:00 p.m. on May 6th.

NYSE called LRPs or slow quotes in all 42 stocks listed on its main market in which NASDAQ broke trades. Over 90 percent of the 236 securities in which NASDAQ broke trades were listed on NYSE, NYSE Arca or NYSE Amex. Over 87 percent of the trades and 89 percent of the executed shares broken by NASDAQ were in NYSE-listed securities. NASDAQ declared no slow quotes in the 20 stocks listed on its market in which trades were broken.

Why Do The Markets Break Trades? Markets break executed trades when the price discovery process ceases to function properly and trade prices cease to reflect a true market. For such circumstances, the SEC has approved uniform clearly erroneous rules across all U.S. cash equities markets giving the exchanges the self-regulatory authority to cancel clearly erroneous trades executed by their systems. We followed those rules.

The exchanges can review trades and exercise this authority on their own initiative in response to extraordinary market conditions, or, upon the timely request of a party to a particular trade(s). Trade-break authority exists to nullify trades that take place in market conditions where errors, be they human or technological, or other unanticipated events, preclude fair and proper price-discovery. The primary topic of the market-wide call was to determine whether the exchanges would coordinate their regulatory efforts to break trades that were considered "clearly erroneous."

NASDAQ's clearly erroneous trade policies strive to maximize consistency, transparency and finality regarding trade-break decisions. NASDAQ pioneered the use of standardized numerical parameters that seek to define how far a trade must deviate from previous transactions in order to be considered erroneous. By focusing on objective numerical criteria rather than subjective criteria, NASDAQ avoids even the appearance of bias in the trade break process. These standardized criteria have now been adopted by all U.S. exchanges. It is important to remember that every trade has two parties—generally one will be happy to break the trade and avoid a loss while the other will want to keep the trade and any gain he or she has made. Therefore, it is important that NASDAQ use its authority only where necessary.

One key component to NASDAQ's approach to clearly erroneous trade processing is the belief that it is important, where possible, to allow transactions priced close to the inside market or other reference price to stand, even if the transactions directly resulted from a mistake or system error. This ensures that market participants have economic incentives to develop and maintain internal controls with a goal of preventing erroneous trading activity. NASDAQ refers market participants for investigation by the Financial Industry Regulatory Authority ("FINRA") in its capacity as NASDAQ's regulatory services provider in all circumstances where a firm's erroneous trades raise questions as to the adequacy of the firm's computer systems and internal controls.

What Lessons Can We Learn From Trading On May 6th?

NASDAQ's preliminary analysis indicates that unusual trading activity on May 6th was triggered by a confluence of unusual events, including events outside the cash equities markets. Aggressive, nervous selling of S&P 500 options and futures migrated to trading of closely correlated cash equities. Cash equity markets then experienced several challenging conditions as described above. NASDAQ experienced no system malfunctions or aberrations. No NASDAQ member has identified to NASDAQ a system error or aberration within their own systems. We have at this point in time detected no system malfunction or errant trade by a NASDAQ member interacting with the NASDAQ Stock Market. NASDAQ continues to investigate the events of May 6th, but has at present located no "smoking gun" that singlehandedly caused or explains those events.

We note that although index products such as ETFs linked to the S&P 500 Index were involved in the trading events on May 6th, there is no evidence that ETFs caused those events. To the contrary, the unusual trading and subsequent trade breaks in ETFs can be explained by existing market structure and characteristics of ETF trading. ETFs are widely used as a tool for gaining exposure to the broad market, particularly during periods of high volatility. Therefore, demand for ETF liquidity was likely rising during the May 6th trading event. While ETF demand was increasing, ETF liquidity was decreasing. NYSE Arca, which lists ETFs and is a source of ETF liquidity (particularly for thinly traded ETFs) was experiencing communications and linkage issues. Three markets had stopped routing orders to it, effectively removing Arca's liquidity from the marketplace. The resulting liquidity imbalance in ETFs exacerbated the rapid price changes that many stocks were experiencing at that time. In other words, the events of May 6th affected ETFs more than many other securities but not differently.

NASDAQ supports the rapid and holistic response by the Securities and Exchange Commission. We support the Commission's recommendation to update market-wide circuit breakers that limit large price changes. The proposed circuit breaker would automatically halt trading in all stocks and in all markets in measured stages. As currently contemplated, trading will be halted for fifteen minutes when the S&P 500 Index declines by 5 percent; for 1 hour when the Index declines by 10 percent; and for the remainder of the trading day when the Index declines by 20 percent.

NASDAQ also supports the Commission's decision to implement cross-market single-stock trading halts. The important characteristics of these halt are initiation and resumption by the primary market, as well as consistency across all markets. The markets have taken a flexible approach that recognizes that stocks trade in different ways, rather than a one-size-fits-all approach that treats all stocks identically. These single stock circuit breakers will greatly reduce the occurrence of clearly erroneous broken trades by preventing them from executing in the first instance.

In addition to endorsing and assisting Chairman Schapiro in achieving the goal of consistency and cooperation across all markets, NASDAQ also supports regulators' decision to review practices that cause individual markets to pause or go slow. As stated in the joint SEC and CFTC report issued on May 18, 2010, "Preliminary Findings Regarding the Market Events of May 6th", while such practices are designed to dampen volatility, a determination must be made whether they also "inappropriately impede liquidity."

Finally, NASDAQ is exploring other ideas which may encourage high-quality and continuous quoting on all markets. Other options to consider that may reduce the number of disruptive trading events are: (1) requiring priced orders rather than market orders; (2) eliminating or limiting the practice of "stub quoting;" and (3) creating better incentives to provide liquidity during periods of market stress. NASDAQ has already been a leader in promoting more aggressive risk management controls for al orders entered into all market centers. NASDAQ has actively supported the Commission's proposal to improve regulation of all forms of market access that create systemic risk in our markets.

Thank you again for the opportunity to share our views. I am happy to respond to any questions you may have.

PREPARED STATEMENT OF TERRENCE A. DUFFY

EXECUTIVE CHAIRMAN, CME GROUP INC.

MAY 20, 2010

I am Terrence A. Duffy, executive chairman of CME Group Inc. Thank you Chairman Reed and Ranking Member Bunning for inviting us to testify today. You asked us to discuss issues surrounding the activity in the equity markets on Thursday, May 6, 2010, particularly to review the causes and implications of the market activity as well as to identify what policy changes may be necessary to avoid a recurrence of such activity.

CME Group is the world's largest and most diverse derivatives marketplace. We are the parent of four separate regulated exchanges, including Chicago Mercantile Exchange Inc. ("CME"), the Board of Trade of the city of Chicago, Inc. ("CBOT"), the New York Mercantile Exchange, Inc. ("NYMEX") and the Commodity Exchange, Inc. ("COMEX"). The CME Group Exchanges offer the widest range of benchmark products available across all major asset classes, including futures and options on futures 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 cus-

tomer base by facilitating transactions through the CME Globex® electronic trading platform, our open outcry trading facilities in New York and Chicago, as well as through privately negotiated CME ClearPort transactions.

I. Introduction

Since May 6, 2010, CME Group has engaged in a detailed analysis regarding trading activity in its markets on that day. Our preliminary review indicates that *our markets functioned properly.* We have identified *no* trading activity that appeared to be erroneous or that caused the break in the cash equity markets during this period. Moreover, *no* market participant in our markets reported that trades were executed in error nor did the CME Exchanges cancel ("bust") or re-price any transactions as a result of the activity on May 6th. Moreover, the CME markets provided an important price discovery and risk transfer function on that day and served as a moderating influence on the markets.

In the following sections, we discuss: (1) the functioning of and the role played by our markets on May 6, 2010, (2) the existing circuit breaker rules and the need for consistent and transparent rules across markets and (3) CME electronic functionality, particularly CME Stop Price Logic functionality and price banding, among others, which serve to protect our markets. Finally, we have also included certain recommendations as to changes that could avoid a recurrence of this type of event in the future.

II. The CME Markets Functioned Properly on May 6, 2010

a. CME Has Conducted an Initial Review of Detailed Trading Records

CME Group analyzed trading volume and activity throughout May 6 and focused particularly on the activity taking place during the period of 1pm to 2pm Central Time. Total volume in the June E-mini S&P futures on May 6th was 5.7 million contracts, with approximately 1.6 million or 28 percent transacted during the period from 1pm to 2pm Central Time. During that hour, the market traded in a range of 1143.75 to 1056, or 87.75 points—beginning the hour at approximately 1142 and ending the hour at approximately 1113. More than 250 CME Globex execution firms and 9,000 User IDs were active in the market during this period of time.

During most of that hour, the bid/ask spread was a tick wide (.25 points) and the market traded in a largely orderly manner despite the significant sell off and subsequent rally. At approximately 1:45:28, following a sharp 12.75 point decline over a period of approximately 500 milliseconds on the sale of 1100 contracts by multiple market participants, the bid/ask spread widened to 6.5 points or 26 ticks for less than one millisecond.

At that point, one of CME Globex's risk management functionalities, a CME Globex Stop Price Logic event, which is discussed in more detail below, was triggered. As a result, the market was automatically paused for 5 seconds to allow liquidity to come into the market. The market subsequently reopened at 1056.75, and thereafter rallied more than 40 points to 1097 in the following 3 minutes.

The Market Regulation Department reviewed a significant amount of activity during this period, a period that included more than 3 million system messages, and, in particular, examined the activity of participants whose trading activity during the 1-hour period was significant or otherwise warranted further review. The review conducted by Market Regulation staff has not identified any evidence of improper or illegal activity by market participants.

b. CME Markets Provided an Important Price Discovery and Risk Transfer Function on May 6

From a broader perspective, the cumulative record of May 6 trading activity underscores the fact that CME's futures markets, due to their high level of liquidity, provided an important price discovery and risk transfer mechanism for all market participants on that day.

The equity index futures contracts traded on CME Group designated contract markets provide an essential risk management function, allowing investors to hedge their exposure against a portfolio of shares or equity options. The most significant equity index futures contract traded on the CME Group Exchanges is the E-mini S&P 500 futures contract. In 2009, the E-mini contract traded over 556 million contracts, which represents an average daily volume in excess of 2.2 million contracts, making the E-mini S&P futures contract the most liquid equity index futures contract worldwide. Throughout the challenging market conditions on May 6, market participants utilized the liquidity and efficiency of the E-mini S&P 500 futures contracts to meet their risk management needs; the contract effectively facilitated customer demand to hedge exposure to a declining broader market and, as will be shown below, represented a moderating factor during the session.

The primary purposes of futures markets are to provide an efficient price discovery and risk management mechanism. In particular, the academic literature underscores the efficacy of futures markets as a tool of price discovery. According to one study, "[e]mpirical results confirm that futures market plays a price discovery role, implying that futures prices contain useful information about spot prices."[1] As such, stock index futures frequently represent the venue in which price information is revealed first, generally followed closely by spot markets. In fact, most researchers find that "futures lead the cash index returns, by responding more rapidly to economic events than stock prices."[2]

Futures contracts, by design, provide an indication of the market's view of the value of the underlying stock index. Casual observation may lead to the conclusion that the E-mini S&P futures prices appeared to lead the decline in the cash market. However, the decline was consistent with declines in the most complementary equity derivative products, ETFs based on the same index, trading in the cash market. Unlike the cash market, the decline in the futures market was then mitigated by the operation of our risk management technology which halted the market for a short period to enable additional liquidity to enter into the futures market. Attached as Exhibit 1 is a chart which illustrates the comparative value of the E-mini, traded on the futures market, as compared to the equities markets. The ETF most comparable to the E-mini S&P 500 futures is the SPDR S&P 500 ETF Trust (SPY). The chart demonstrates that the E-mini S&P moved virtually in tandem with the comparable cash instrument until the moment when our Stop Price Logic was triggered which caused our matching engine to pause for 5 seconds while continuing to allow new orders to be entered. At the time the Stop Price Logic was triggered, the E-mini S&P ceased its drop, while certain individual stocks in the cash market continued their steep decline. Following the halt, the E-mini S&P then rallied sharply. We believe this recovery was positively influenced by our Stop Price Logic functionality which stabilized market activity. This type of functionality is not available in the securities market. Consequently, even while the broad based index markets—SPYs and CME E-mini S&P—were substantially recovering, there were continued price declines in individual stocks which persisted for minutes (not seconds).

More specifically, to illustrate this point, we reviewed the period from 13:30 to 14:00 (CT) during which the market activity occurred as depicted in Exhibit 2. E-mini S&P 500 futures were declining after 13:30 (CT) followed by spot equity markets including Proctor & Gamble (PG), 3M (MMM) and Accenture (ACN). The June 2010 E-mini S&P 500 futures traded at its low of 1,056.00 at 13:45:28 (CT), at which point the Stop Price Logic functionality was triggered halting the decline, and the market rallied following the 5-second halt. PG, MMM and ACN continued to slide even after futures hit their low and began to recover. Those stocks were put into a reserve mode by the New York Stock Exchange (NYSE) per its Rule 1000(a), Liquidity Replenishment Points, at 13:45:52, 13:50:36, 13:46:10 (CT), respectively; however, these stocks continued to decline. We believe that this decline continued because orders were re-routed to possibly less liquid security trading venues which were not coordinated with NYSE Rule 1000(a). PG printed a low of $39.37 at 13:47:15 (CT); MMM printed a low of $67.98 at 13:45:47 while ACN printed a low of $0.01 at 13:47:54 (CT). Thus, the E-mini S&P 500 futures were rallying while PG, MMM and ACN continued to decline.

As stated above, we believe that this temporary de-linkage between the futures and stock markets may be attributed to inconsistent rules across the equity markets which enabled the stocks to decline even further.

The trading activity during this time period also evidences that the futures markets provided an important source of liquidity which served as a moderating influence in the markets. There is strong evidence that the E-mini S&P futures contract was much more liquid than the fragmented underlying stock market on May 6. During the period between 1:40 and 2 CST, the volume of E-mini S&P futures (notionally adjusted) was 3 to 4 times greater than the SPY volume and, at the peak of the market's volatility, was to 8 to 10 times greater. As noted above, E-mini S&P 500 futures slightly lead SPYs during the downturn. Both E-mini S&P 500 futures and SPDRs turned around near 13:45:28. But, as shown in Exhibit 1, the rally in futures was relatively consistent and orderly in contrast to the rally in SPYs which

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[1] See Floros, C. and Vougas, D. V. (2007) Lead-Lag Relationship between Futures and Spot Markets in Greece: 1999–2001, *International Research Journal of Finance and Economics,* 7, 168–174.

[2] Kavussanos, Manolis G., Visvikis, Ilias and Alexakis, Panayotis, The Lead-Lag Relationship between Cash and Stock Index Futures in a New Market. European Financial Management, Vol. 14, Issue 5, pp. 1007–1025, November 2008.

was very uneven and was highlighted by a significant increase in cash equity market spreads.

The second-by-second trading range, which is an indicator of the liquidity in the market, was much tighter in E-mini S&P 500 futures than in the comparable equity product, the SPYs. In examining the ratio of the futures trading range relative to the SPYs (SPDR) trading range in 1-minute intervals between 13:30 and 14:00 (CT), the respective trading ranges were very similar at the beginning of the period. By the height of the incident near 13:45–13:50, however, the ratio had fallen to as low as 20 percent that of the SPDR range. While all the markets were less liquid than in normal times, the liquidity in the futures market degraded much less than in the SPY market (which, in turn, degraded much less than the individual stocks, especially those stocks that are thinly traded.) This suggests that the futures order book was much deeper and more resilient than the SPDRs order book. In other words, the E-mini S&P 500 futures market continued to absorb trading volume and trade in an orderly fashion even in the face of apparent crisis in spot equity markets when liquidity was most sorely needed. As such, futures represented a moderating factor throughout the incident.

If the futures market had not been available as an alternative, the selling would have manifested itself through another venue, potentially in a less liquid market, such as the underlying stock market or the OTC derivatives market. The relative tightness of the spread in the futures market underscores the fact that a concentration of liquidity supported the important price discovery and risk transfer role of the futures market.

III. Circuit Breaker Levels Should be Reviewed In View of May 6 and Rules Should be Consistent Across Markets.

One of the mechanisms that exchanges have implemented to curb market volatility are "circuit breaker" rules. Circuit breaker rules require an automatic halt in trading when pre-determined price thresholds are reached. CME Group Exchanges currently have circuit breaker rules in effect for equity index products which are consistent with the circuit breaker rules in the underlying equity markets.

Circuit breaker rules were originally introduced following the September 1987 market crash. The circuit breakers were implemented uniformly across all equities and options exchanges and were set at a fixed price level tied to the DJIA. This rule was embodied in NYSE Rule 80B. On October 27, 1997, the circuit breakers were triggered for the first time and the circuit breaker rules were subsequently modified to employ percentage declines of 10, 20 and 30 percent in the DJIA established at the start of each calendar quarter in lieu of the fixed point triggers previously used. That rule remains in effect.

In addition to the coordinated circuit breakers, CME adopted price limit rules for its equity index contracts. The price limit structure and levels changed several times as the Exchange acquired more experience and as the trading halt rules in the equity market were modified.In January 2008, however, CME harmonized its price limit percentage thresholds to be fully consistent with the percentage thresholds reflected in NYSE Rule 80B (and also consistent with the methodology employed by the CBOT with respect to the DJIA futures). CME did, however, retain the references to the specific stock index that is the subject of the futures contract rather than tying these limits to movements in the DJIA, meaning, for example, that the E-mini S&P 500 price limits are tied to price movements in the related index.

CME implements an unconditional futures trading halt in the equity index futures when the primary stock market is halted, regardless of whether a particular index product has hit a limit or not. CME also enforces a 5 percent limit bid or offer policy during overnight electronic trading hours; if equity index futures are locked limited at 8:15 a.m. Central Time ("CT") and remain so at 8:25 a.m. CT in the lead month futures contract, there will be a trading halt in effect until the commencement of regular trading hours (floor and electronic trading). During the trading halt, the Exchange will provide an Indicative Opening Price of the re-opening of trading on CME Globex, if applicable. If the lead month futures contract is no longer locked limit at 8:25 a.m. CT, trading will continue with the 5 percent limit in effect. At 8:30 a.m. CT, the 5 percent overnight electronic trading hours limit no longer will be applicable.

On May 6, the declines in the DJIA were just short of 10 percent at a time of day when the 20 percent trigger was in effect. As a result, the circuit breakers in the primary and the futures markets were not triggered. Accordingly, we believe that the current circuit breaker levels of 10, 20 and 30 percent, the duration of the halt and the time of day at which such triggers are applicable, should be reevaluated in light of current market conditions to determine whether any changes are warranted

After May 6, CME staff reviewed the relevant processes and rules across the CME and equities exchanges to determine what protections existed in the operating rules of the numerous equities platforms in the event of a market disruption. Due to the fragmented nature of the equity markets, it appears to us that there is a lack of consistency across this market which could exacerbate issues in time of market stress.

For instance, as noted above, we believe that the lack of consistency and coordination among equity platforms in the establishment of circuit breakers for individual stocks led to extreme market disruptions; when the NYSE rule circuit breaker rule was invoked with respect to trading in individual stocks, order flow circumvented the NYSE market and trading continued on other platforms which did not have comparable protections. Consequently, as a result of the lack of liquidity on these other platforms, trading in those individual stocks suffered significantly.

We also note that in the aftermath of the May 6 incident, there was significant confusion in the equity markets over the cancellation or "busting" of trades. The standards for cancellation of trades are not consistent or transparent across the equity markets as a whole. At the CME, we have clear standards for the implementation of "no bust" ranges (*i.e.,* ranges within which trades may not be canceled) and error trades. These policies are clearly set forth in our rulebook and are posted on our website.

We believe that, to ensure the integrity of the market and to promote market confidence among users, there must exist a clearly defined rule set which is transparent to market users, understood by market users and which is consistent across all markets.

IV. CME Has Risk Management Controls to Mitigate the Potential for Disruption of its Markets

In addition to the circuit breaker and price limit rules described above, CME has in place numerous risk management processes, procedures and systems to preserve the integrity of its market in light of the many risks associated with maintaining a primarily electronic market. For example, CME is the only exchange in the world that requires pre-execution credit controls which become mandatory in June 2010. Appended as Exhibit 3 is a detailed list and description of the multitude of controls that the CME employs on its CME Globex system, including credit controls, messaging volume controls and risk protection policies and procedures.

There are certain risk protection tools employed by the CME which are important to note individually and which are relevant to today's discussion. One of these tools, CME Globex Stop Price Logic functionality, was employed on May 6—its operation and effect are also described below. In addition, CME Exchanges have a number of other policies and procedures, such as our messaging policy and practice of registering Automated Trading Systems ("ATS") that provide us with the tools to monitor and maintain orderly administration of the electronic markets and provide real time surveillance and oversight of trading activity.

a. Stop Price Logic Functionality

The CME Globex system has a Stop Price Logic functionality which serves to mitigate artificial market spikes that can occur because of the continuous triggering, election and trading of stop orders due to insufficient liquidity. If elected stop orders would result in execution prices that exceed pre-defined thresholds, the market automatically enters a brief reserved state for a predetermined time period, ranging from 5—10 seconds. During this period, no orders are matched but new orders other than market orders may be entered and orders may be modified and canceled. The momentary pause that occurs when Stop Price Logic is triggered allows market participants the opportunity to provide liquidity and allows the market to regain equilibrium, thereby mitigating the potential for disruptive market moves.

The stop spike price and time parameters in the E-mini S&P futures are 6 index points (approximately ½ of 1 percent of the S&P 500 index value) and 5 seconds, respectively.

The Stop Price Logic was triggered on May 6th in the E-mini S&P 500 equity index. At 1:45:27, 1 second prior to going into reserve state, the front month E-mini S&P 500 equity index futures contract was trading just under the 1070.00 level. Multiple parties entered the market selling and taking the market down to 1062.00. There was a stop order to sell 150 contracts at 1062.00 which moved the markets to 1060.25, and elected additional stops that were filled down to 1059. The trades at 1059 triggered another 150 lot stop at 1059.00 which was executed down to a level of 1056.00, which would have elected additional stops.

However, at this point, following the 6 point move from 1062 to 1056, the front month E-mini S&P 500 equity index futures market went into reserve state as a

result of Stop Price Logic functionality being triggered at 13:45:28. The market came out of this reserve state 5 seconds later. As a result of this brief suspension of trading, the decline in the E-minis was halted and the market came out of the reserve state with an initial price of 1056.75, after which it rallied sharply. Consequently, we believe that the triggering of this functionality served its intended purpose of allowing market participants the opportunity to provide liquidity and permitting the market to regain its equilibrium.

b. Price Banding Functionality

To ensure fair, stable and orderly markets, CME Globex subjects all orders to price verification using a process called price banding. The platform utilizes separate mechanisms for futures price banding and options price banding. Price banding prevents the entry of erroneous orders such as a bid at a price well above the market or an offer at prices well below the market which could trigger a sequence of market-moving trades that require subsequent cancellations. In order to determine the level of price banding, CME Exchanges use the most current and relevant market information, including, for futures, trades, best bid and offer and implied bid and offer or indicative opening price, and for options, last price of an option or spread and a theoretical options price based on options pricing algorithms.

c. Protection Points for Market and Stop orders

This CME Globex functionality automatically assigns a limit price (Protection Point) to futures market orders and stop orders to preclude the execution of these types of orders at extreme prices in situations where there is insufficient liquidity to support the execution of the order within an exchange-specified parameter of the current market.

The Protection Point values vary by product, and in the E-mini S&P futures the Protection Point is established at 3 index points. The CME Globex system calculates the limit price for a Market Protected Order by applying the Protection Point value to the best bid or offer price (depending on the order's side of market) and by applying the Protection Point value to the trigger price for a Stop Protected Order. Any unmatched quantity remaining for a Market Protected or Stop Protected Order after it is executed to the Protection Point limit becomes a Limit Order at the Protection Point limit price.

d. Maximum Order Size Protection

Maximum order size functionality on CME Globex prohibits entry of an order into the trading engine which exceeds a pre-determined quantity. For E-mini S&P 500 futures, the order size is 2,000 contracts. This functionality provides protection against the so-called "fat finger" trades.

In addition, we would like to point out certain risk management practices and measures we take which, in addition to the risk management tools noted above, serve to mitigate potential problems that could result from electronic trading, particularly with high frequency trading.

e. Messaging Policies

CME has in place certain controls and policies which are designed to avoid problems associated with excessive messaging by market participants. CME has instituted a CME Group Messaging Policy that encourages market participants to trade and quote appropriately without harming market liquidity or performance. Inefficient messaging slows system performance, negatively impacts other market participants and increases system capacity requirements and costs. To mitigate this, CME has implemented automated controls which monitor for excessive new order, order cancel and order cancel/replace messaging. If a session exceeds a designated message per second threshold over a 3-second window, subsequent messaging will be rejected until the average message-per-session rate falls below this threshold.

CME has also instituted a policy of fining for excessively high messaging rates. This policy benefits all customers trading on CME Globex by discouraging excessive messaging abuses, which in turn helps to ensure that CME Globex maintains the responsiveness and reliability of the system. Under the CME Globex Messaging Policy, each clearing member firm must not exceed product-specific benchmarks, individually tailored to the valid trading strategies of each market. CME Group calculates benchmarks based on a per-product volume ratio, defined as the number of messages submitted for each executed contract in a given product.

f. Registration of ATS

All Automated Trading Systems ("ATS") using CME Globex are required to identify themselves as an "ATS" and register with the CME Group Exchanges. Subsequent to their registration, the CME Group Exchanges are able to monitor the trad-

ing activity of ATSs on both a real time and post-trade basis. CME has required ATS registration for its equity index products since 2006. This policy has now been expanded to ATS' for all products and we currently have over 10,000 ATS registered.ATSs are treated like any other market participant and are subject to the messaging policy. This, in turn, enables CME to prevent a malfunctioning trading system from impacting our markets.

V. High Frequency Trading Enhances Liquidity

An important issue raised in this discussion is the contribution of high frequency traders ("HFTs") to the current situation and their future role in the markets. As recently described in the SEC's Concept release on market structure, high frequency trading was identified as one of the most significant market structure developments in recent years. Although HFT is not clearly defined, "it typically is used to refer to professional traders acting in a proprietary capacity that engage in strategies that generate a large number of trades on a daily basis."

CME believes that HFTs play an important role in the markets, *particularly when such activities are engaged in the types of risk management procedures detailed in the previous section.* HFTs are an important part of daily trading activity in the marketplace and have evolved in response to advancements in technology. This represents the natural evolution of technological advancements and improvements in the marketplace and the percentage of trading volume attributable to HFTs will likely continue to increase in the future. There is evidence that HFTs increase liquidity and transparency in the marketplace and narrow spreads which allows investors to buy and sell securities at better prices and at lower costs.

It is also important to note that not all HFTs are alike. A significant proportion of HFTs on the CME promote liquidity by providing continuous markets in our products. As illustrated by the events of May 6, in analyzing the role of several HFTs, a majority of those entities' trading executed during the relevant 1-hour period was related to the firm's market making activities. Thus, before considering restrictions on HFT activity, consideration should be given to the beneficial role played by HFTs in providing liquidity during normal market activity as well as during times of increased market stress.

The use of high frequency trading by proprietary trading firms, investment banks, hedge funds and index traders, among others, has made the marketplace more efficient and competitive for all market participants. Careful consideration should be given to any decision to place significant restrictions or limitations on HFTs that would be harmful to the marketplace and result in less efficient and less liquid markets. It is also important to note that automated trading or algorithmic trading has its origins in Europe. Accordingly, efforts to place limits or impose regulatory burdens on HFTs in the United States may encourage HFTs to shift the trading they currently conduct in the United States to Europe and other foreign jurisdictions that are already well-equipped to handle additional growth in both equities and futures.

As noted above, CME Globex employs many risk management policies and procedures which assist in the mitigation of risk associated with any type of electronic trading, including that of HFTs. In addition, the CME Group Exchanges are proactive in monitoring the trading activity of HFT entities. In sum, CME believes that HFTs play an important role in the markets, *particularly when such activities are engaged in with the types of risk management procedures detailed in the previous section.*

VI. Recommendations

As noted previously, CME has endeavored to extensively examine the activity in our markets on May 6, 2010. Upon review of the activity, to this point, we believe that there are potential changes which would improve the functioning of the markets during times of severe stress.

Throughout this process we have worked closely with our regulator, the CFTC, as well as with other regulators not only to identify the causes of significant volatility on May 6, but also to assist in providing thoughts and recommendations for market improvement. Of course, as we continue to study the events further, we would be happy to contribute our further thoughts and recommendations.

- *Circuit breakers, including circuit breakers for individual stocks such as that implemented by the NYSE, must be harmonized across markets.* As we stated above, we believe that consistency and transparency across markets benefits the market by providing clarity in times of market stress. In reviewing the trading activity of May 6, we believe that the lack of consistency and coordination across markets exacerbated the decline in price of certain individual stocks. The NYSE exercised its Liquidity Replenishment Rule (*i.e.,* its individual stock "cir-

cuit breaker" rule) to slow down its markets; Orders were then directed to other less liquid electronic trading venues which had no such rule.

- *Stop Price Logic functionality should be adopted across markets, on a product by product basis, to prevent cascading downward market movements.* As evidenced by the trading activity on May 6, we believe that our Stop Price Logic functionality provided the opportunity to source needed liquidity at a crucial time and contributed to allowing the market to gain its equilibrium.
- *The current circuit breaker levels of 10, 20 and 30 percent, the duration of the halt and the time of day at which such triggers are applicable, should be re-evaluated in light of current market conditions to determine whether any changes are warranted.* A comprehensive, coordinated and quantitative review of the market wide circuit breaker levels and duration of pause should be undertaken across all market centers and trading venues supporting equity based products, including cash equities, single name and index options, single stock futures, index futures and options on index futures and total return swaps and structured products. Any effort should be examined and coordinated across markets and the input of all market operators should be sought.

EXHIBIT 1

COMPARATIVE VALUE – E-Mini S&P 500 Futures
vs. SPDR (SPDR S&P 500 ETF Trust)

Duffy Testimony Attachment
Senate Banking Committee, May 20, 2010
Graph-vs-SPYexhibit1

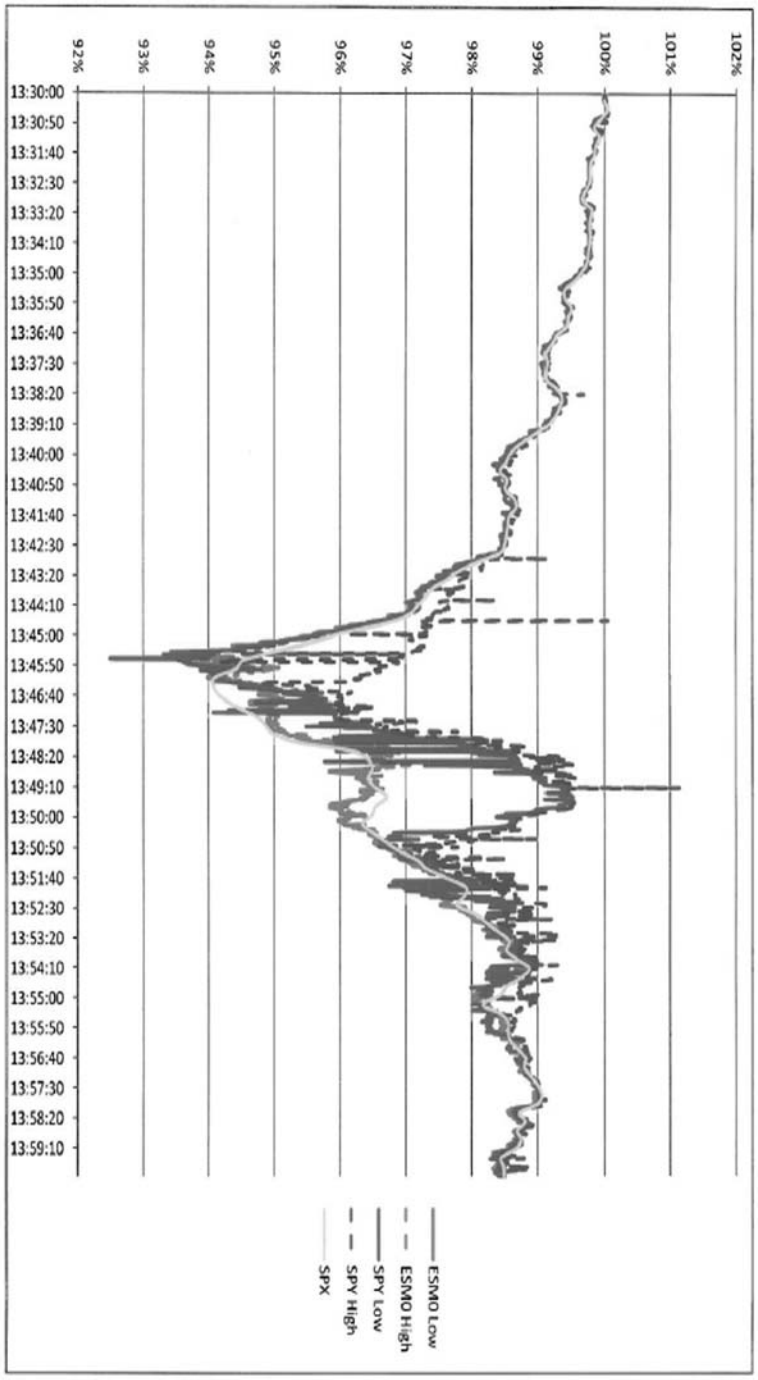
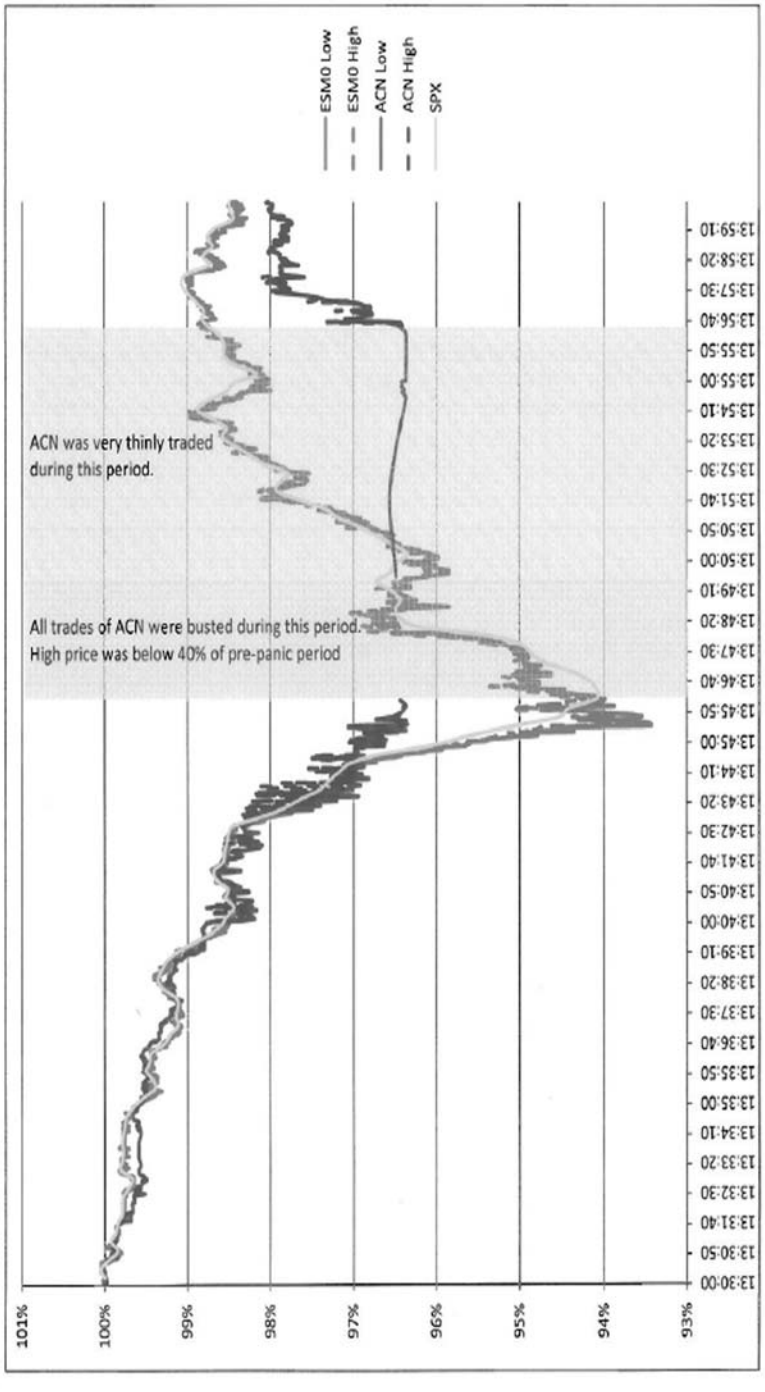
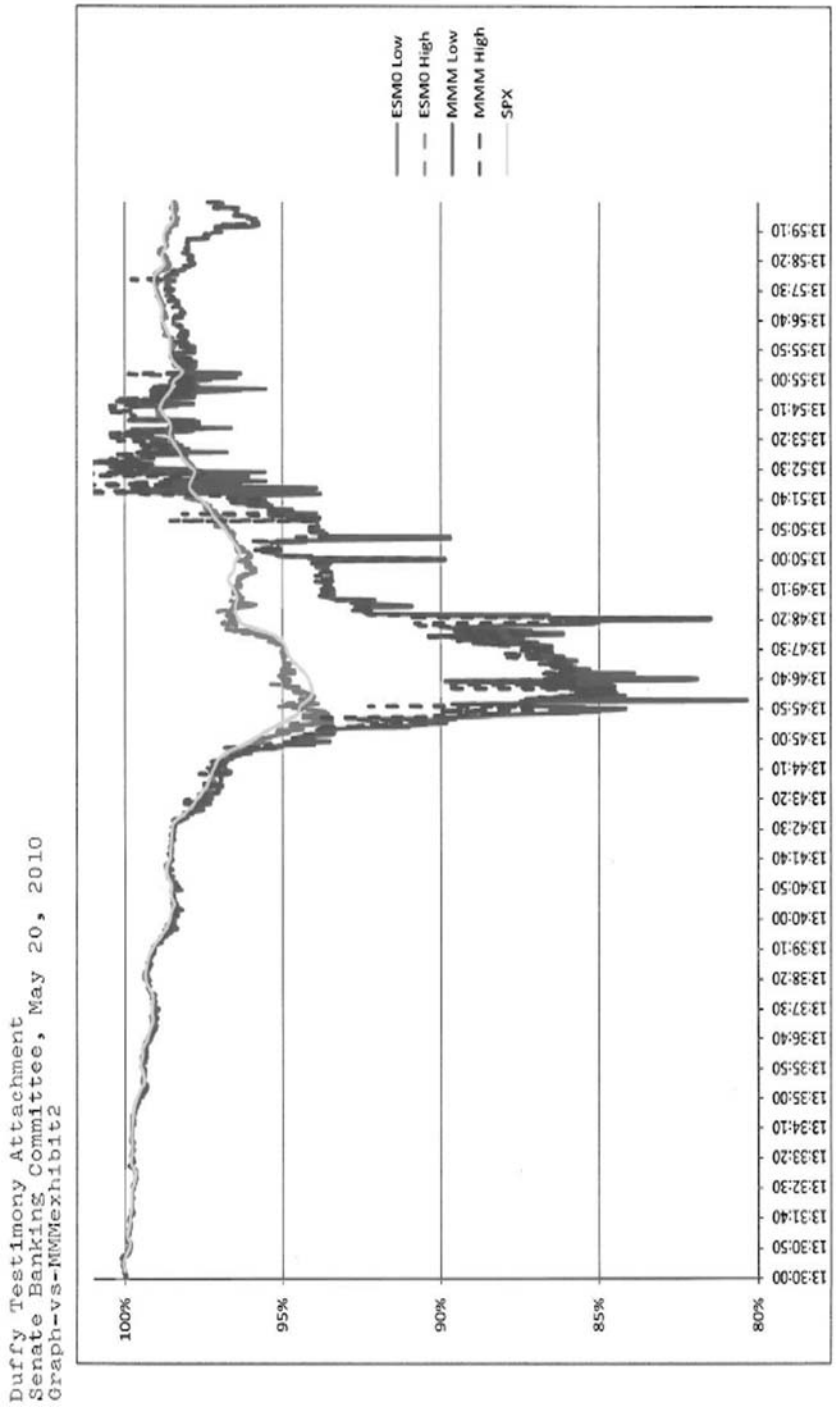


EXHIBIT 2

MARKET ACTIVITY – E-Mini S&P 500 Futures
vs. ACN, MMM, PG



Duffy Testimony Attachment
Senate Banking Committee, May 20, 2010
Graph-vs-ACNexhibit2


Duffy Testimony Attachment
Senate Banking Committee, May 20, 2010
Graph-vs-MMMexhibit2
ESM0 Low
ESM0 High
MMM Low
MMM High
SPX
100%
95%
90%
85%
80%
13:30:00
13:30:50
13:31:40
13:32:30
13:33:20
13:34:10
13:35:00
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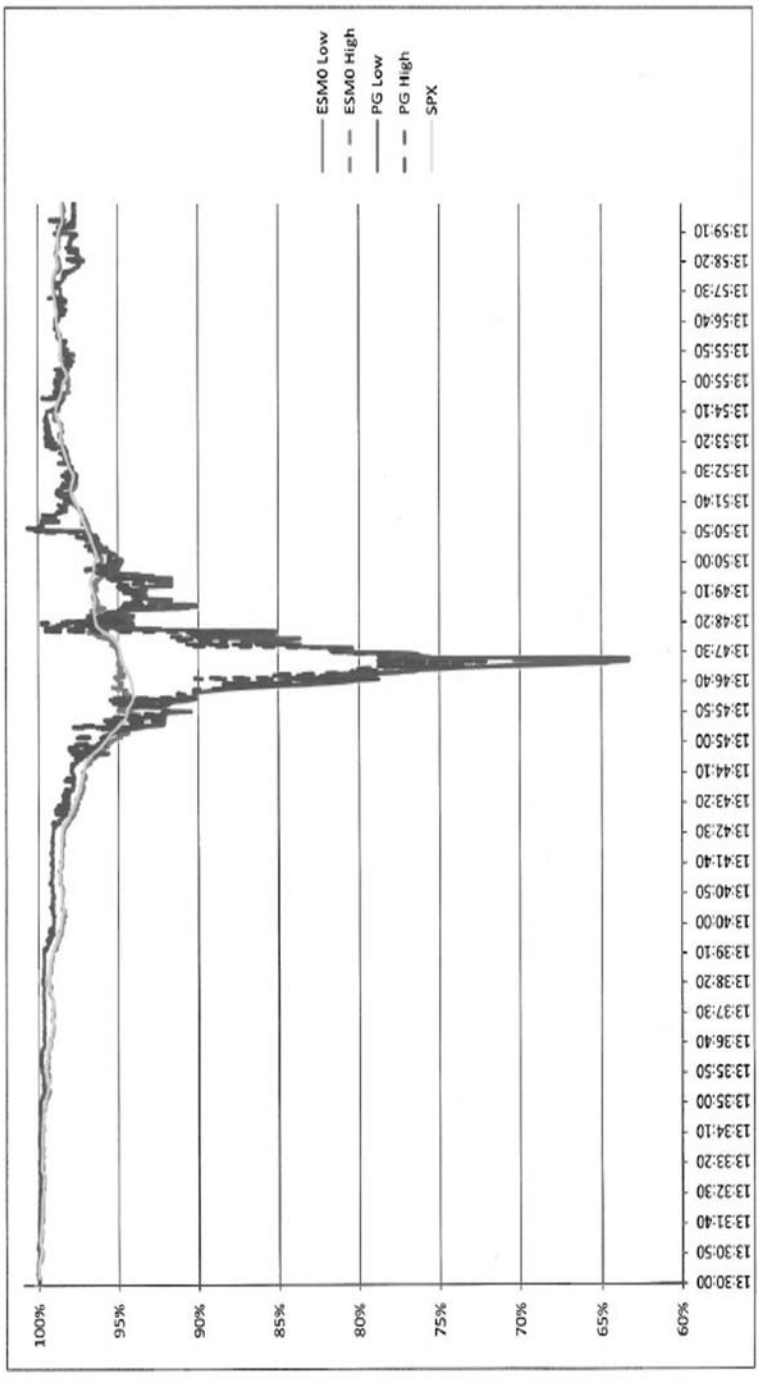
13:59:10

Duffy Testimony Attachment
Senate Banking Committee, May 20, 2010
Graph-vs-PGexhibit2



RESPONSE TO WRITTEN QUESTION OF SENATOR VITTER FROM MARY L. SCHAPIRO

Q.1. In your testimony, Chairman Schapiro, you described the events of May 6 as "a 20-minute period during the afternoon of May 6" in which "the U.S. financial markets failed to live up to their essential price discovery function." As a result, you have announced that the SEC is focused on taking steps "to reduce the likelihood of a recurrence of that day."

If it is the case that the "flash crash" was the result of high volume players pulling out of the market, removing a dramatic amount of liquidity, how will the changes the SEC intends to implement protect against that?

A.1. On September 30, 2010, the staffs of the SEC and CFTC released a report on the findings regarding the market events of May 6. As highlighted in that report, one of the key lessons learned from the events of May 6 is that many market participants employ their own versions of a trading pause—either generally or in particular products—based on different combinations of market signals. While the withdrawal of a single participant may not significantly impact the entire market, a liquidity crisis can develop if many market participants withdraw at the same time. This, in turn, can lead to the breakdown of a fair and orderly price-discovery process, and in the extreme case trades can be executed at stub-quotes used by market makers to fulfill their continuous two-sided quoting obligations.

In response to this phenomenon, and to curtail the possibility that a similar liquidity crisis can result in circumstances of such extreme price volatility, the SEC staff worked with the exchanges and FINRA to promptly implement a circuit breaker pilot program for trading in individual securities. The circuit breakers pause trading across the U.S. markets in a security for 5 minutes if that security has experienced a 10 percent price change over the preceding 5 minutes. On June 10, the SEC approved the application of the circuit breakers to securities included in the S&P 500 Index, and on September 10, the SEC approved an expansion of the program to securities included in the Russell 1000 Index and certain ETFs. The circuit breaker program is in effect on a pilot basis through December 10, 2010.

A further observation from May 6 is that market participants' uncertainty about when trades will be broken can affect their trading strategies and willingness to provide liquidity. In fact, in the staff interviews many participants expressed concern that, on May 6, the exchanges and FINRA only broke trades that were more than 60 percent away from the applicable reference price, and did so using a process that was not transparent.

To provide market participants more certainty as to which trades will be broken and allow them to better manage their risks, the SEC staff worked with the exchanges and FINRA to clarify the process for breaking erroneous trades using more objective standards. On September 10, the SEC approved the new trade break procedures, which like the circuit breaker program, is in effect on a pilot basis through December 10, 2010.

Going forward, SEC staff will evaluate the operation of the circuit breaker program and the new procedures for breaking erroneous trades during the pilot period. As part of its review, SEC staff intends to assess whether the current circuit breaker approach could be improved by adopting or incorporating other mechanisms, such as a limit up/limit down procedure that would directly prevent trades outside of specified parameters, while allowing trading to continue within those parameters. Such a procedure could prevent many anomalous trades from ever occurring, as well as limit the disruptive effect of those that do occur, and may work well in tandem with a trading pause mechanism that would accommodate more fundamental price moves.