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Securities and Exchange Commission
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Dear Securities and Exchange Commission:

Here are some additional comments on the Equity Markets Concept Release. On May 6, 2010, R.T. Leuchtkafer wrote (<http://www.sec.gov/comments/s7-02-10/s70210-175.htm>):

“I have read and respected Professor Angel's work for many years. It is unfortunate that less than a week after he wrote here "The equity market structure is working better than ever" our equity markets lost \$1 trillion and made it back, all in about 15 minutes.”

Yes, indeed, it is unfortunate that the big glitch that I repeatedly warned about has come to pass. In the same comment letter (<http://www.sec.gov/comments/s7-02-10/s70210-172.pdf>) quoted by R.T. Leuchtkafer, I said on page 5 (yellow text and **bolding** are in the original):

“High frequency technology requires high frequency circuit breakers.

There is one risk that HFT imposes on the market that must be addressed by the Commission. With so much activity driven by automated computer systems, there is a risk that something will go extremely wrong at high speed. For example, a runaway algo at a large firm could trigger a

large series of sell orders across multiple assets, triggering other sell orders and causing major disruptions with losses in the billions. With the global linkage of cash and derivative markets around the world, it would be extremely difficult to go back after the fact and bust the appropriate trades, leading to years of litigation. The uncertainty and confusion would cause serious damage. Even more troubling is the prospect that such a glitch could be caused intentionally, either by a disgruntled employee or a terrorist.

All market participants have the right incentives to prevent this from happening. The brokerage firms and exchanges have filters in place designed to catch “fat fingers” and other mistakes. However, the never ending quest for higher speed also creates incentives for them to cut corners and eliminate time consuming safeguards that might slow their response time. In today’s competitive market place, no one market center can take all the needed actions alone. There needs to be coordinated guidance from the Commission on this issue.

No human system is perfect. Despite all of the correct incentives and precautions, airplanes sometimes crash. Eventually there will be some big glitch. We need a market wide circuit breaker that is activated automatically in real time. It is my understanding that the crude market-wide circuit breakers imposed after the crash of 1987 are currently operated manually. In the minute or so it takes for humans to respond to a machine meltdown, billions of dollars of damages could occur.¹ The April 28, 2009 incident involving Dendreon is an example of what can go wrong. The stock lost over half its value for no apparent reason in less than two minutes before the humans could stop trading. When trading resumed, the stock returned to its previous value. Many investors who had placed stop orders experienced severe losses from trades that were not busted. Almost exactly one year later, on April 27, 2010, a botched basket trade resulted in the need to bust clearly erroneous trades in over 80 different stocks. It is extremely messy to attempt to bust erroneous trades after the fact, especially if multiple instruments in multiple asset classes traded on multiple exchanges in multiple countries are involved. For example, an investor may sell stock that was purchased during the malfunction only to find that the purchase was busted but not the later sale, leading to an inadvertent naked short position. We need a real time circuit breaker that can stop the market before extreme damage occurs.

The Commission should consider imposing an automated market wide trading halt in any instrument that falls 10% in a short period of time. The stock would then re-open using the opening auction after humans have examined the situation to make sure that the stock can be re-opened in a fair and orderly manner.

If this Commission fails to act on this risk after asking so many questions about HFT in this Release, this Commission and its staff will be blamed for ignoring this risk when the inevitable big glitch occurs.”

¹ See Bernard S. Donefer, *Algos Gone Wild: Risk in the World of Automated Trading Strategies*, *Journal of Trading* 5 (2), Spring 2010 pages 31-34 <http://www.ijournals.com/doi/abs/10.3905/JOT.2010.5.2.031>

Warning Number 2

In my joint study with former SEC chief economists Lawrence Harris and Chester Spatt (<http://www.sec.gov/comments/s7-02-10/s70210-54.pdf>), we stated on page 47:

8.3 Misfiring algorithms

In a related area, we are also concerned that, even without naked access, the risk control procedures at a brokerage firm may fail to react in a timely manner when a trading system malfunctions. In the worst case scenario, a computerized trading system at a large brokerage firm sends a large number of erroneous sell orders in a large number of stocks, creating a positive feedback loop through the triggering of stop orders, option replication strategies, and margin liquidations. In the minutes it takes humans at the exchanges to react to the situation, billions of dollars of damage may be done.

Currently our exchanges have no automatic systems that would halt trading in a particular stock or for the entire market during extraordinary events.⁶ It is our understanding that the circuit breakers instituted after the Crash of 1987 would be manually implemented, which could take several minutes.⁷ These circuit breakers are triggered only by changes in the Dow Jones Industrial average, so severe damage could be done to other groups of stocks, and the circuit breakers would not kick in. Also, a misfiring algorithm could also create a “melt-up” as well. We recommend that the exchanges and clearinghouses examine the risk and take appropriate actions. Perhaps the issue most simply could be addressed by requiring that all computer systems that submit orders pass their orders through an independent box that quickly counts them and their sizes to ensure that they do not collectively violate preset activity parameters.

Warning Number 3

In my September 21, 2009 comment letter to the SEC on short selling (<http://www.sec.gov/comments/s7-08-09/s70809-4658.pdf>), I stated on page 1:

The big picture is that today's warp speed computerized markets contain the potential for another financial catastrophe at warp speed. If an algorithm at a large financial institution misfires, whether because of an honest malfunction or sabotage, it could create an enormous critical chain reaction that would cause a tsunami of economic destruction within milliseconds. Yet we currently rely on slow humans at our exchanges to make decisions. We need automated circuit breakers that function on a stock by stock basis that will kick in instantly when something goes haywire. To date, the SEC has taken the same approach to such warnings as FEMA took to warnings that New Orleans was vulnerable to a Category 5 hurricane. Do we need a Category 5 meltdown in the equity market before the SEC moves to take action to prevent such a preventable calamity? The individual exchanges cannot act on their own because of the competitive fragmented nature of our modern markets. If a single exchange halts trading, it stands at a competitive disadvantage to its competitors. Dealing with this threat requires intelligent coordinated action by the SEC.

We didn't have a Category 5 hurricane on May 6, 2010; we only had a Category 1. A Category 5 is still a distinct possibility if we do not make the right reforms.

Warning Number 4

In my comment letter of June 19, 2009 (<http://www.sec.gov/comments/s7-08-09/s70809-3758.pdf>), I stated on page2:

Our electronic markets lack a shock absorber.

Most electronic exchanges around the world have automated systems in place to deal with extreme events. We don't. High speed algorithmic trading has brought amazing liquidity and low transactions costs to the markets, but it also brings the risk of market disruption at warp speed.

Our markets are vulnerable to short-term fluctuations that can result in prices that do not reflect the market's consensus of the value of the stock. The disruption in the trading of Dendreon (DND) on April 28, 2009 that I referred to in my remarks at the Roundtable is a smoking gun. (My remarks are repeated at the end of this comment letter for you convenience as well.)



The stock plunged for no apparent reason, and by the time the humans halted trading the damage was done. Many investors who had placed stop-loss orders discovered that their orders had been filled at very low prices. Furthermore, incidents like these bring up suspicions of foul play, and these suspicions hurt our capital markets. When investors think that market manipulation is unpunished, they will withdraw from our capital markets, reducing their usefulness to our society.

Short selling is not the only cause of short term market disruptions.

A burst of short selling can cause a “Dendreon moment”, but so can long selling. Markets can also be disrupted on the up side as well. In considering what to do about situations like this, the Commission should consider the broader needs of the market for a shock absorber to deal with excessive short-term volatility.

The Commission should actively consider shock absorbers that deal with ALL price disruptions, not just ones triggered by short sales. One time-tested model to consider is the “volatility interruption” used by Deutsche Börse.² When the stock moves outside of a reference range, trading is halted for a period of time and trading then restarts with a call auction.

We need not follow the Deutsche Börse model exactly. Short orders at prices below the previous opening or closing price could be excluded from the restarting auction (with appropriate exemptions for market makers and arbitrageurs). After trading restarts, restrictions should be placed on short sales at prices 5% or more below the previous opening or closing price to maintain fair and orderly trading. These could include 1) preborrowing requirements or a bid test.

Any changes should be carefully studied with a transparent pilot experiment.

Before the Commission institutes any such changes, it should experiment carefully as it did with the original Regulation SHO pilot. In this way, the Commission could adopt the best of the different proposals after carefully examining their impact.

² http://deutsche-boerse.com/dbag/dispatch/en/binary/gdb_content_pool/imported_files/public_files/10_downloads/31_trading_member/10_Products_and_Functionalities/20_Stocks/50_Xetra_Market_Model/marktmodell_aktien.pdf

Warning Number 5

In my May 5, 2009 comments presented at the SEC Roundtable on short selling (<http://www.sec.gov/comments/4-581/4581-2.pdf>), I warned on page 3 that we would have more high speed meltdowns like the one that affected Dendreon in April 2009:

“We need a shock absorber to prevent another Dendreon.”

Those calling for a return of some type of uptick rule are expressing a legitimate concern. They intuitively grasp that there is something wrong with short-term price formation in our markets today. The recent incident with Dendreon (DNDN) on April 28, 2009 demonstrates the need for a shock absorber. The company was about to make an announcement regarding the effectiveness of its prostate drug Provenge. The stock plunged 69% in less than two minutes.³ After the news was revealed, the stock quickly returned to its previous levels. Investors who had placed stop loss orders to protect themselves found that their orders were executed at very unfavorable prices. Why did the stock plunge? It is too early to tell. Was it a “fat fingers” mistake in which an investor hit the wrong button? Did an algorithm misfire? Was it a chaotic interaction between dueling algorithms? Did a long seller panic and dump too many shares too fast? Was there a deliberate “bear raid” manipulation going on from informed traders hoping to push the price down so they could trigger stop loss orders and scoop up shares cheaply? Or was it just the case that the market was very thin just before the news announcement and a few large sell orders exhausted the available liquidity, triggering the selloff? Regardless of the reason, the incident demonstrates the need for a shock absorber to deal with extreme situations.

³Ortega, Edward, Nasdaq Will Let Stand Dendreon Trades Under Review
<http://www.bloomberg.com/apps/news?pid=newsarchive&sid=a314cxKBoGHI>



The era in which humans traded with humans is long gone. Now computers trade with other computers in the blink of an electron. Most other developed equity markets around the world have some kind of procedure for dealing with extreme situations. Whether it is a price limit, a trading halt, or a special quote mechanism, the United States needs to install a shock absorber to deal with excessive volatility. One of the main purposes of the stock market is to provide good price discovery. If the price discovery mechanism appears to be broken, it will reduce investor confidence in the market.

Unfortunately, merely reimposing the old useless uptick rule or forcing a pre-borrow for shorted shares will not solve the problem of excessive intraday volatility. What is needed is to think outside the box of “lets get the short sellers” to the more useful question of “what kind of shock absorber works best in our modern markets?”

It is certainly not obvious what form such a shock absorber should take. One thing that is clear is that the 1939 uptick rule will not achieve the objective of reducing excess volatility. Installing a broken shock absorber from a 1939 Chevrolet Coupe into our 2009 Corvette market will not do the job. What would make sense is a dampener similar to the exchanges’ proposal. The beauty of the exchange’s circuit-breaker with restriction idea is that it does not interfere with normal market operations under normal conditions. It only kicks in when needed, at times when the market is under stress. Perhaps a more gradual shock absorber would make more sense. For example, one approach would be:

- *At prices at or above 5% below the previous close: No restrictions*
- *At prices below 5% below the previous close: Hard preborrow for short sales*
- *At prices 10% below the previous close: price test for short sales*

- *If the price hits 20% below the previous close: Automatic 10 minute trading halt. The stock would reopen with the usual opening auction after market surveillance has determined that there are no pending news announcements.*

I urge the Commission to begin consultation with the industry to develop one that fits the unique and competitive nature of our markets. If nothing is done, there will be more Dendreons.”

On May 6, 2010 we had 289+ Dendreons. Now that this problem finally has the attention of our regulators and legislators, I am confident that we will come up with mechanisms to address the problem. However, just because the market structure glitched for five minutes does not mean that the entire market structure is wrong and should be discarded.

Our market structure still works better than ever – most of the time.

One can think of the old manual stock market as being similar to a manual typewriter. We upgraded it to an electric typewriter, and then to a word processor. On May 6, 2010, that word processor went into a five minute spasm that highlighted many of the flaws I have been warning about. However, that does not mean that we should throw out the word processor and go back to a manual typewriter. It means we need to put safeguards in place to make sure that it doesn't happen again.

There are several possible reforms that would improve the market structure

- The need for stock-by-stock circuit breakers is now widely accepted.
- Market orders can be seriously disruptive and should be restricted to retail accounts and to sizes less than \$10,000.
- Stop orders without limit prices are accelerants to market declines and should be eliminated. All stop orders should be required to have a limit price.

Respectfully submitted,

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