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Securities and Exchange Commission
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Re: Lessons learned from the NASDAQ Glitch

Dear Securities and Exchange Commission:

In summary:

- We need to re-think how we restart the market after a market-wide trading halt.
- We need to test market reopenings during regular trading hours.
- Backups for the SIP need to be rethought.
- It was appropriate to halt trading when the market data feed was corrupted.

[1] I am also on the boards of directors of the EDGA and EDGX stock exchanges. My comments are strictly my own and don't necessarily represent those of Georgetown University, the University of Pennsylvania, EDGX, EDGA, or anyone else for that matter.

- It was appropriate to take the time to get the re-opening right.
- Better communication during a trading outage is essential to maintaining market confidence.

Background

On Thursday, August 22, 2013 communication issues affected the Securities Information Processor ("SIP") that distributes the trades and quotes on all NASDAQ-listed stocks.[2] These issues effectively took down the SIP data feed at 12:03 PM. NASDAQ called a regulatory trading halt. However, trading halt messages generally go over the SIP, and since the SIP was down it took time for market participants to get the message. Trading continued on some trading systems for some time after NASDAQ called the halt. Trades in NASDAQ-listed stocks that occurred after 12:23:31 PM were cancelled.[3] Trading was restarted on a gradual basis, first with test symbols and then a single stock. After a 15 minute quote period, trading resumed in all symbols at 3:25 PM.

Fortunately, this incident occurred on a low-volume and low-volatility day in late summer. If this had occurred during a time of high volatility or high volume, there could have been serious instabilities in the market causing a greater loss of investor confidence in the integrity of the market mechanism.

We need to re-think how we restart the market after a market-wide trading halt.

One of the reasons for the delay in restarting the NASDAQ market was concern about whether trading could resume in a fair and orderly manner. It is clear with 20-20 hindsight that the markets need to reconsider how trading is restarted after a market-wide trading halt.

We have a market-wide trading halt every day. We re-start in a gradual way each morning with a well-oiled mechanism. Some exchanges turn on their computers as early as 4:00 AM. The more adventurous traders trade in the pre-open trading, while retail and other orders queue up for the fair and orderly 9:30 AM opening auctions. This pre-open trading produces battle-tested prices that inform the price discovery in the opening auctions. The auctions then open regular trading hours in a fair and orderly manner.

The SEC recently approved changes to the market-wide trading halts.[4] A Level 1 halt of 15 minutes will occur if the S&P 500 drops 7% below the previous close before 3:25 PM. Given that such a halt will take

[2] For more details, see Equity Trader Alert #2013 - 77 Post Mortem: NASDAQ Trading Halted in Tape C Securities; Markets Operating Normally http://www.nasdaqtrader.com/TraderNews.aspx?id=ETA2013-77.

[3] According to the NYSE TAQ database, there were over 2,800 such trades in the NASDAQ 100 symbols alone.

[4] See http://www.sec.gov/rules/sro/bats/2012/34-67090.pdf, SR-BATS-2011-038, SR-BYX-2011-025, SR-BX-2011-068, SR-CBOE-2011-087, SR-C2-2011-024, SR-CHX-2011-30, SR-EDGA-2011-31, SR-EDGX-2011-30, SR-FINRA-2011-054, SR-ISE-2011-61, SR-NASDAQ-2011-131, SR-NYSE-2011-48, SR-NYSEAmex-2011-73, SR-NYSEArca-2011-68, SR-Phlx-2011-129

place during a time of great uncertainty and volatility in the market, it is not clear that the human participants in the market will be able to re-open all 4,000+ stocks in a fair and orderly manner in 15 minutes. Even though exchange electronic systems may be functioning perfectly, there is a limit to the attention bandwidth that the human users of the exchanges can deliver in a time of extreme uncertainty. Human traders monitoring their trading positions may need more time to assess the situation and adjust their orders.

It may make more sense to have a gradual re-opening after a market-wide halt. Here is one possible scenario: First re-open the Dow 30 along with a few select ETFs such as the SPY, DIA, and QQQQ. Then five minutes later open the rest of the S&P100 and a few more ETFs such as the larger sector ETFs. Then five minutes later re-open the rest of the S&P500 and the rest of the 100 most active ETFs. Then five or ten minutes later re-open everything.

Serious consideration should also be given to allowing pre-open trading five or more minutes before regular trading resumes with regular opening auctions. Just as pre-open trading lubricates the regular opening auctions with fair and orderly price discovery, it could also facilitate an orderly reopening after a market-wide trading halt.

We need to test market reopenings during regular trading hours.

The exchanges conduct regular industry-wide tests of their technology systems when the markets are closed.[5] However, no matter how thoroughly the exchanges attempt to create an appropriate simulation environment, such weekend simulations are a pale imitation of real trading conditions. We won't know how the plans to re-open a market will work until we test them under real trading conditions. For this reason, it will be important to test the procedures for re-opening the market at least once each year during regular trading hours. This will give all market participants – including the media and retail investors -- experience in dealing with re-opening procedures. This experience will be extremely helpful in reducing the uncertainty when the market-wide circuit breakers kick in for real.

We need backup for the SIPs.

Ordinarily, our competing exchanges serve as *de facto* backups for each other. If one exchange has trading problems, the others merrily trade around it and most investors never notice. However, all exchanges report to the SIP, and we learned that the SIP represents a single point of failure in the national market system. Since regulatory messages go over the SIP, there is no elegant way to get such messages out when the SIP goes down.

We need to think about proper ways to back up the SIP. Since we already have two SIP processors, NYSE and NASDAQ, it would appear to make sense that each SIP processor should back each other up.

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[5] For example, see Equity Technical Update #2013 - 23 Limit Up/Limit Down Industry Test Plan for Saturday, July 27, 2013 http://www.nasdaqtrader.com/TraderNews.aspx?id=ETU2013-23.

Each exchange is already physically connected to both SIPs, it should be fairly simple to implement such a backup.

We should also rethink the whole SIP structure and consider whether we need a SIP at all or whether we should have multiple competing SIPs.

It was appropriate to halt trading when the market data feed was corrupted.

One of the lessons learned during the Flash Crash is that market participants pull out of the market when there are problems with data integrity. Fortunately, the August 22 incident occurred on a day with low volume and low volatility, so a Flash Crash did not recur. However, one could have recurred if market conditions had been different. Even though exchange trading platforms and proprietary feeds apparently functioned properly, it was appropriate to halt the market when the SIP data feeds that retail and other investors rely upon went down. Failing to halt the market would have created an unlevel playing field in which the subscribers to proprietary data feeds had good information and the rest of the market was at a disadvantage.

It was appropriate to take the time to get the re-opening right.

One of the lessons learned from the Facebook IPO is that a quick restart after a technology incident is no good if subsequent glitches mar the quality of the price discovery. The market participants should be commended for taking the time to test the systems and restart the market in a fair and orderly manner.

Better communication during a trading outage is essential to maintaining investor confidence.

Technology fails, and most people understand that outages will occasionally occur. What is important for investor confidence is to see that the exchanges have procedures in place to deal properly with unexpected occurrences. Good communication with the public during an outage is essential for maintaining investor confidence. During the outage, I would have liked to have seen a NASDAQ spokesperson on CNBC explaining what was known about the outage and giving general background about the procedures in place to fix such outages.

As part of the Regulation SCI process, exchanges should be encouraged to have procedures in place to communicate in real time to the public reliable information about the nature of an outage.

If you have any questions, feel free to email or call me.

Respectfully submitted,

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