September 28, 2015

John Comerford
Head of Global Trading Research
Instinet Holdings Incorporated
john.comerford@instinet.com

Instinet, LLC
1095 Avenue of the Americas
New York, N.Y. 10036

MAN vs MACHINE: How Many Humans Does it Take to Open a Market?

Interesting Times

US equity market volatility has spiked to levels last seen almost four years ago (Figure 1), prompting the New York Stock Exchange to invoke its Rule 48 four times, three times in August and once so far in September. The financial press depicted these Rule 48 declarations as measures to temper market fluctuations or as significant reductions in the flow of information from the exchange regarding price formation in the opening auctions. In reality, Rule 48 did neither of these things.

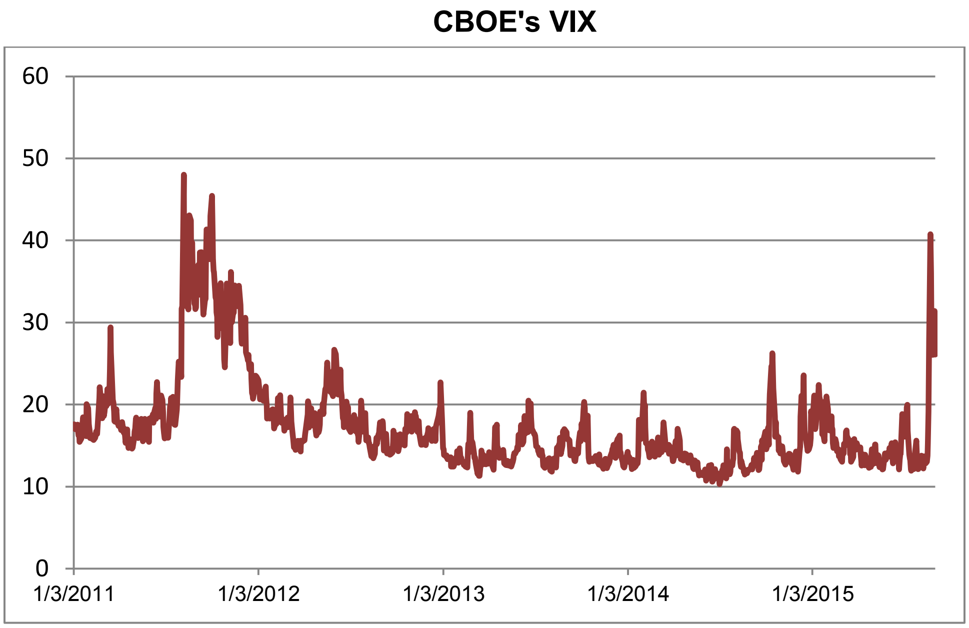

Figure 1 Source: CBOE

As we read NYSE's rule book, the primary effect of Rule 48 in recent days was to exempt Designated Market Makers (DMMs) from a requirement to manually post price ranges when the auction cross is expected to have a significant change versus the previous night's close. Under the rule, NYSE also could have suspended publication of imbalances and indicative auction prints, but it didn't. Apart from the price range exemption, NYSE's DMM-led opening process appears to have been the same as on days when Rule 48 is not invoked.

Transparency

Contrary to numerous press depictions[1], for most NYSE-listed stocks Instinet received indications of the expected size and price of auction prints as on normal days. Here (Table 1), is the indicative data for IBM on August 24, the first and most turbulent of the days when NYSE recently declared Rule 48 to be in force.

Table 1 Source: Instinet

Time Stamp	Indicative Volume	Indicative Price	Imbalance Direction	Imbalance Size
2015-08-24 09:28:00	121,000	144.73	Sell	91,500
2015-08-24 09:28:15	121,900	145	Sell	90,200
2015-08-24 09:28:30	121,900	144.57	Sell	94,500
2015-08-24 09:28:45	112,600	144	Sell	104,200
2015-08-24 09:29:00	110,400	144	Sell	108,200
2015-08-24 09:29:15	109,400	144	Sell	110,700
2015-08-24 09:29:30	109,200	143.99	Sell	116,700
2015-08-24 09:29:45	114,200	144	Sell	122,700
2015-08-24 09:30:00	114,200	143.75	Sell	142,100
2015-08-24 09:30:15	115,500	143.64	Sell	166,900
2015-08-24 09:30:30	117,600	143.7	Sell	161,300
2015-08-24 09:30:45	119,900	143.7	Sell	164,300
2015-08-24 09:31:00	119,900	143.75	Sell	163,900
2015-08-24 09:31:15	140,700	144.01	Sell	135,200
2015-08-24 09:31:30	147,100	144.28	Sell	115,300
2015-08-24 09:31:45	147,000	144.2	Sell	116,000
2015-08-24 09:32:00	147,200	144.2	Sell	134,000
2015-08-24 09:32:15	148,200	144	Sell	139,600
2015-08-24 09:32:30	146,200	143.96	Sell	139,500
2015-08-24 09:32:45	156,800	144	Sell	137,100
2015-08-24 09:33:00	155,600	144.13	Sell	129,500
2015-08-24 09:33:15	163,600	144.4	Sell	125,100
2015-08-24 09:33:30	162,700	144.2	Sell	118,700
2015-08-24 09:33:45	159,100	144.19	Sell	124,200
2015-08-24 09:34:00	154,500	144.1	Sell	130,700
2015-08-24 09:34:15	159,100	144	Sell	135,300
2015-08-24 09:34:30	160,400	144	Sell	137,700
2015-08-24 09:34:45	160,000	144	Sell	140,500

[1] NBC's website has this head-scratcher: "Rule 48 speeds up the opening by suspending the requirement that stock prices be announced at the market open." That same article opened with this: "In an historic move, the New York Stock Exchange invoked the little-used Rule 48 to pre-empt panic selling at the stock market open on Monday."

IBM opened trading a little after 9:35 at a price of $144.00 with 227,522 shares changing hands. It was among the 62% of NYSE-listed S&P500 names that opened after 9:35. The opening delays were problematic in their own right, but matters were made worse by the fact that NYSE currently stops disseminating indicative prints at 9:35. For the large number of stocks that opened considerably after this arbitrary cutoff, there *was* a dramatic reduction in the transparency of the price-formation process, but the loss of transparency was not due to Rule 48, *per se*.[2]

While Rule 48 itself may have been largely a red herring in the popular discussion of recent market events, it does have symbolic content: It signals that NYSE officials expect a turbulent start to the trading day. NYSE and Nasdaq have very different procedures for opening trading. The recent volatility in the markets has highlighted those differences. We'll take a look at how the two markets performed, focusing particularly on August 24-26 and September 1st, the days when NYSE invoked Rule 48.

More Volume in the Auctions

Opening volumes for the components of the S&P 500 were indeed high on August 24 and 25, but August 26 and September 1 weren't particularly out of the ordinary (Figure 2).

Open as Percent of Full-Day Volume

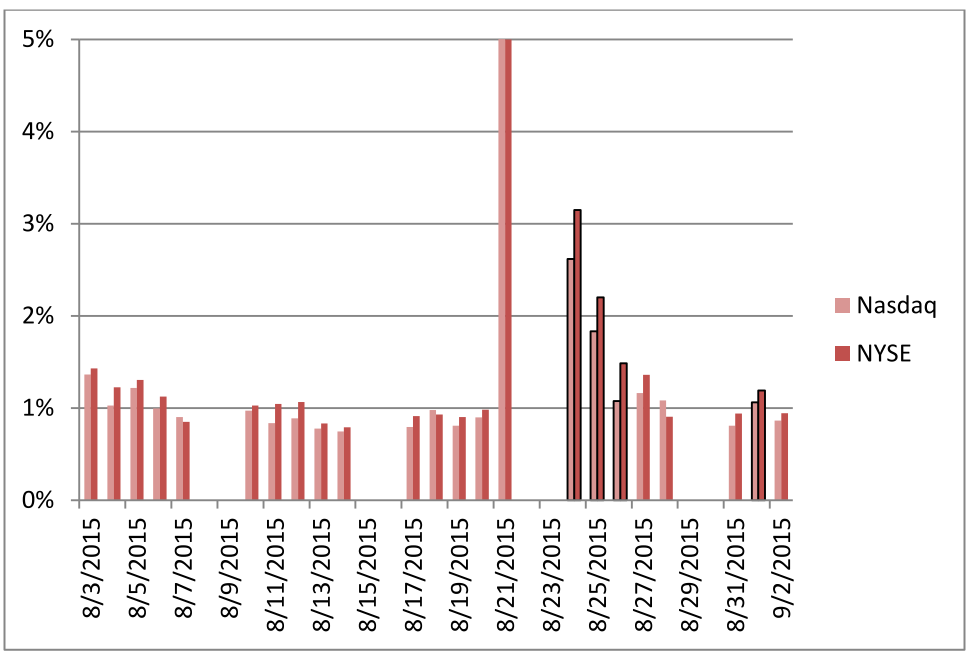

Figure 2 Source: Instinet

[2] The 9:35 cutoff appears to run counter to NYSE's Rule 15—referenced in Rule 48—which says "Order Imbalance Information disseminated prior to the opening of the security will be disseminated... approximately every 15 seconds between 9:20 am ET and the opening of trading in that security.

By contrast, opening volume on the third Friday of August (not even a quarterly expiration) dwarfs even the heaviest Rule 48 days. (The Rule 48 days are shown with black borders.)

Clearly, Rule 48 invocations are not primarily a phenomenon of heavy volume per se. Derivatives expirations produce relatively large information-less auction trades. Market makers have easy access to the open-interest statistics that drive the dynamics of these well-understood market events. Rather, it's the spike in uncertainty captured in Figure 1 that is the primary driver of these events.

In passing, we note that NYSE did pass a somewhat higher fraction of S&P 500 component volume through its auctions on the Rule-48 days than did Nasdaq: 2.0% versus 1.6%. For comparison, both exchanges executed about 1% of daily S&P 500 component volume in the opening auctions on ordinary days in this period.

… But They Took Longer To Do So

A lot longer. Compared with NYSE's elapsed times (after 9:30) to open the stocks in the S&P 500, Nasdaq's sub-half-second times are barely visible in Figure 3. On non-Rule 48 days in our timeframe, NYSE took 84 times as long on average to open. On Rule 48 days, the multiple balloons to almost 600-X with the multiple exceeding 1,000-X on the August 24.

Average Millis > 9:30 to Open

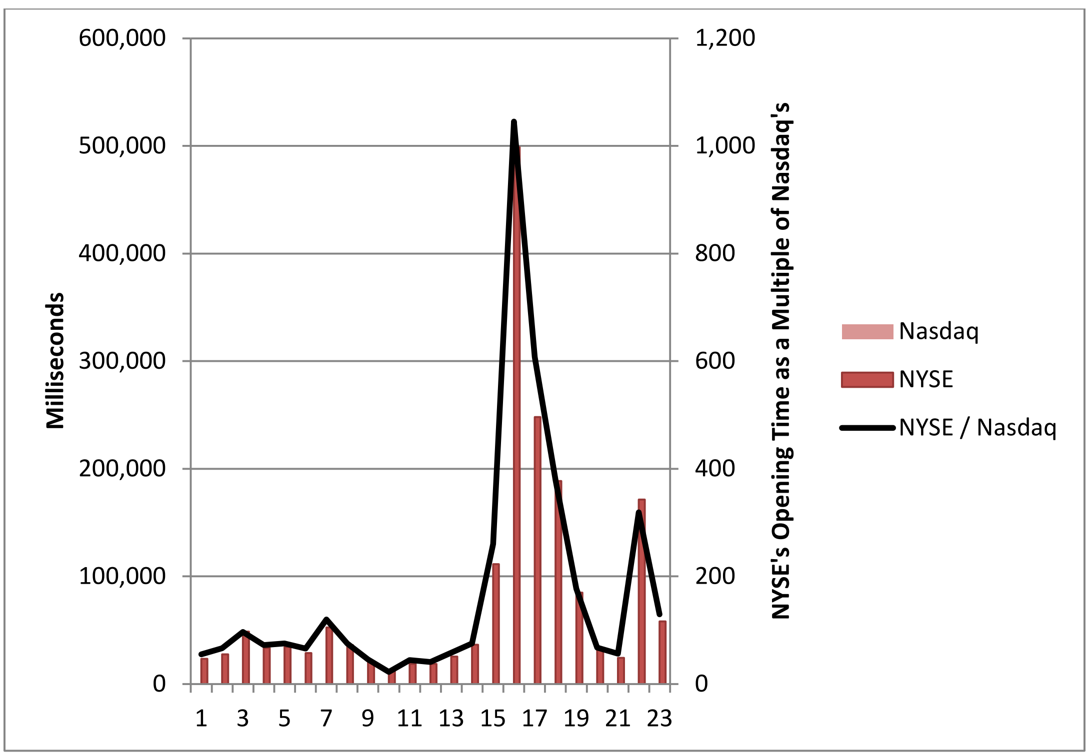

Figure 3 Source: Instinet

Within those averages, there's a lot of variability. Figure 4 breaks down in milliseconds how long it took to open trading in the S&P 500 components on August 24, the most hectic of the Rule-48 days.

Elapsed Time to Open
S&P 500 Components, Aug 24, 2015

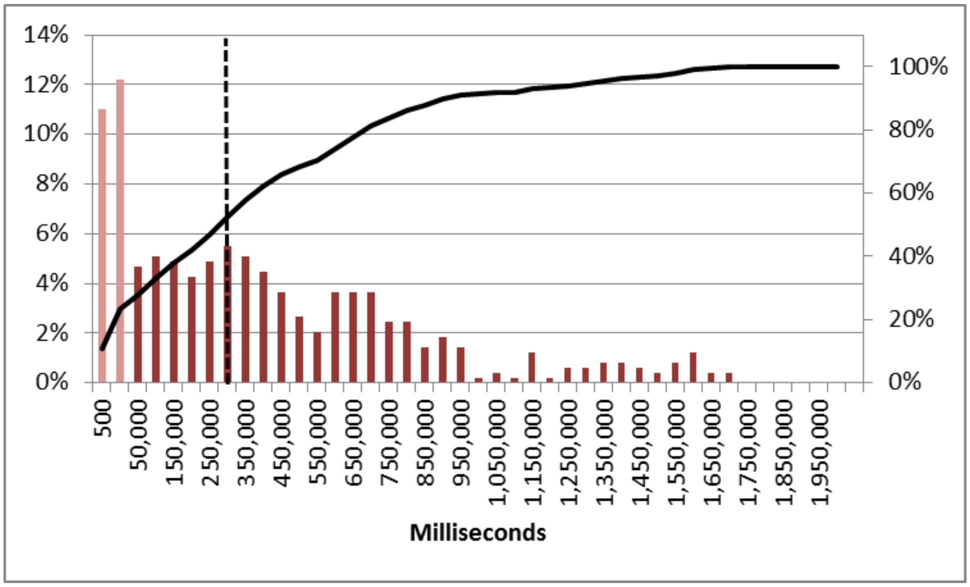

Figure 4 Source: Instinet

The first two light-red bars are at 500 and 1,000 milliseconds. These two bars encompass all the Nasdaq-listed stocks and include only a single NYSE-listed stock. The darker bars, in increments of 50,000 milliseconds, show the elapsed time for all the rest of the NYSE names. In one extreme case it took NYSE about 28 minutes to open an S&P 500 component on this day. The dashed line shows the five-minute cutoff after which NYSE ceased disseminating indicative print information.

So What Do We Get for All That Waiting and Loss of Transparency?

If NYSE's opening prints are in some way demonstrably better than Nasdaq's there can at least be an argument that the time spent waiting for these prints could all be worth it.

ABC news said, "For three straight days this week, the New York Stock Exchange put into action 'Rule 48,' which can essentially speed up the opening of trading to prevent a panicky sell-off all at once." As we've seen, NYSE's open was anything but speedy on these days, but perhaps the NYSE floor used the extra time to marshal liquidity to make the open less volatile.

Looking at the over-night returns of the S&P 1500 components in Table 2, it does not appear that NYSE's opens were any less volatile than Nasdaq's.

Table 2 Source: Instinet

Returns from PNC to Open				
	Nasdaq		NYSE	
Date	Avg	Std	Avg	Std
8/24/2015	-4.83%	2.08%	-5.00%	2.61%
8/25/2015	3.08%	1.58%	2.78%	1.25%
8/26/2015	2.17%	1.18%	2.19%	1.70%
9/1/2015	-1.92%	0.84%	-1.98%	0.88%

On a more sophisticated level, perhaps the NYSE floor does a better job of finding the equilibrium price than does the quicker automated Nasdaq auction. If one market did better than the other at establishing an equilibrium price in its auction, we might expect to see a smaller percentage change in price by, say, 10:00.

At an aggregate level, at least, the advantages of NYSE's opening mechanism aren't particularly apparent here either. Using the components of the S&P 1500, we looked at the mean and standard deviation of returns from the open to 10:00. See Table 3. By this measure, Nasdaq did the best job of finding equilibrium prices on the most challenging day of the period. For the other three days, NYSE showed smaller average price moves. Having said this, NYSE showed greater dispersion in returns pretty much across the board, even though they traded for less time (due to their late opening times).

Table 3 Source: Instinet

Returns from Open to 10:00				
	Nasdaq		NYSE	
Date	Avg	Std	Avg	Std
8/24/2015	1.01%	2.12%	1.49%	2.49%
8/25/2015	-1.56%	1.34%	-1.14%	1.47%
8/26/2015	-1.01%	1.01%	-0.87%	1.01%
9/1/2015	0.53%	0.85%	0.30%	0.97%

Weighing It All Up

Press and popular attention focused on NYSE's Rule 48 during the recent market turmoil. As we've argued, the focus on Rule 48 was a distraction from the core issues surrounding how NYSE conducts its auctions.

NYSE and Nasdaq do things differently. As a general principle, we like when markets innovate. Increasing regulation in the US has left precious few dimensions for markets to compete and differentiate. Differences between markets also provide a welcome laboratory for seeing what works and what doesn't.

NYSE has long touted the involvement of human beings in its price formation process. On these recent turbulent days, the advantages of human involvement are difficult to identify. What isn't hard to identify is the delay and resulting loss of transparency that was introduced into the trading process at a time of greatly heightened uncertainty when, arguably, timeliness and transparency of execution was at a premium.

Recently, we've heard that NYSE is planning on extending the period when it broadcasts indicative auction prints beyond the current 9:35 cutoff. That would certainly improve the situation, but it still begs the question of why NYSE would need more than five minutes to open trading when its competitor needs less than a second.