



## SIFMA Insights

Spotlight: The 10<sup>th</sup> Anniversary of the Flash Crash

*Covid-19 Turmoil Showcases the Resiliency of Today's Markets*

May 2020

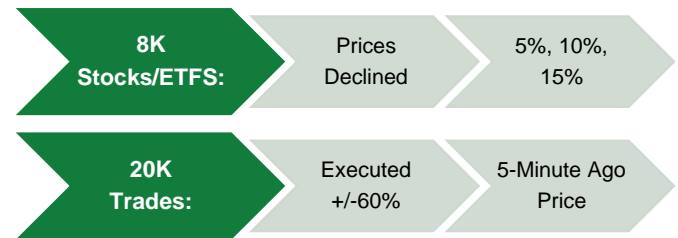
### Key Takeaways

- What was different this time around with the Covid-19 related market turmoil?
- VIX: Covid-19 average 2x Flash Crash (54.22 versus 26.79), with a higher peak (82.69 vs. 45.79)
- Prices: Covid-19 maximum intraday price movement 5x Flash Crash (1,904 vs. 1,010)
- Covid-19 volatility came in hard & remained elevated longer, yet markets remained open & functioning

## Spotlight: The 10<sup>th</sup> Anniversary of the Flash Crash

### Flashback to the Flash Crash

**May 6, 2010:** Markets opened down on concerns of a potential default on Greek sovereign debt. Many stocks and futures contracts prices opened down 4% from the prior day's close. The turbulence continued throughout the day, and widespread negative market sentiment increased volatility, triggering volatility pauses (liquidity replenishment points) on the New York Stock Exchange.



**2:30 PM:** Volatility was spiking, with the VIX up 22.5% from the open. Prices were on the decline, with the Dow Jones Industrial Average (DJIA) down 2.5%. Liquidity<sup>1</sup> was eroding, as proxied by the most active stock index instruments in the futures and equities markets, the E-mini S&P 500 futures contract and S&P 500 SPDR ETF (SPY). Buy-side liquidity fell 55% for the E-mini (to \$2.7 billion from \$6.0 billion) and 30% for the SPY (to \$220 million to \$275 million).

**2:32 PM:** A sell order was entered for 75,000 E-Mini contracts worth around \$4.1 billion. The order was all automated via an algorithm, not split between manual and electronic execution. The buyers of this order then accumulated large long positions, which they proceeded to sell to reduce these directional positions. Between 2:41 p.m. and 2:44 p.m. around 2,000 E-mini contracts were sold, and 140,000 contracts were traded (~33% of total trading volume). The E-mini price fell 3%. At the same time, cross-market arbitrageurs sold the equities equivalent, driving down the SPY price 3%. The sharp and quick declines in price and liquidity caused further selling – in under five minutes prices fell ~5% for the E-mini and ~6% for the SPY.

**~2:45 PM:** This triggered the circuit breaker on the CME, and E-mini trading was halted. Prices stabilized and then began to recover on the E-mini and then the SPY. But the commotion wasn't over, shifting instead to the equities markets. Trading systems of liquidity providers temporarily paused in reaction to the futures and index price action. Fearing a more widespread problem, market makers and other liquidity providers widened quote spreads, reduced offered liquidity and even withdrew completely from transacting. There was roughly a 10x increase in volumes as prices swiftly declined and traders attempted to exit positions, with around two billion shares trading in just 20 minutes. Over 98% of shares were executed at prices within 10% of their 2:40 pm value. Over 20,000 stocks/ETFs were executed at prices 60% off 2:40 pm prices. Around \$1 trillion in market cap was erased at one point.

**~3:00 PM:** Market participants eventually stepped back to verify data and assess the situation. Orderly price discovery and trading began again, and most securities began trading at true fundamental values by 3:00 pm. Most securities recovered most if not all of their losses by the close.

<sup>1</sup> Defined by the SEC as buy-side and sell-side market depth, or resting orders to be executed at prices equal to or outside of current market levels. For the SPY, market depth included only resting quotes within 500 basis points of the mid-quote.

## The Aftermath

In September 2010, the CFTC and SEC released a joint study of the Flash Crash. While the study discusses the convergence of many factors, the main causes included: the large E-minis trade discussed above; illegal manipulative trading (spoofing) on E-minis; and electronic liquidity providers pulling back on quoting prices during the free fall of stock prices. To address the Flash Crash and market volatility in general, the SEC implemented several rules and regulations, including:

- **Stub Quote Ban** – In November 2010, the SEC banned stub quotes. These were essentially placeholder prices set far away from the current price, to a penny or even \$100,000. During the Flash Crash, some electronic liquidity providers entered these to meet market maker requirements yet ensure the trade does not get executed at a price they did not want to take. The SEC changed the rule to require market makers to keep their quoted prices within a reasonable range of the going rate for a given security.
- **Limit Up-Limit Down Mechanism (LULD, 2010)** – LULD prevents stock trades when triggered by large, sudden price moves in an individual stock, i.e. preventing trades from occurring outside of a specified price band. This price band is set at a percentage level above and below the average price of the stock over the preceding five-minute trading period: 5%, 10%, 20% or the lesser of \$0.15 or 75%, depending on the price of the stock (the bands double during the opening and close). If the stock price does not naturally move back within the price bands within 15 seconds, there is a five-minute trading halt.
- **Market Wide Circuit Breaker Revisions (MWCB, 2012)** – MWCBs halt trading during a severe market decline, as measured by a decrease in the S&P 500 Index versus the prior day's close at these thresholds:

	Price Decline	Time of Day	Result
<b>Level 1</b>	7%	Before 3:25 p.m. At or after 3:25 p.m.	Halt trading for 15 minutes Trading continues (unless a Level 3)
<b>Level 2</b>	13%	Before 3:25 p.m. At or after 3:25 p.m.	Halt trading for 15 minutes Trading continues (unless a Level 3)
<b>Level 3</b>	20%	Any time	Halt trading for the remainder of day

- **Consolidated Audit Trail (CAT, 2012)** – To provide a view of the whole market, including granularity at the customer account level, the CAT would hold detailed information (origination, modification, cancellation, routing, execution) for each quote, order and reportable event, linked to track an order's entire life cycle. It would also establish unique and consistent identifiers for broker-dealers, exchanges, account holders and persons with trading discretion over an account. While CAT is scheduled to launch on June 20, 2020, market participants continue to have serious concerns around the potential misuse and/or data breach of the information collected and allocation of liability for such events between the SROs and industry participants.
- **Regulation Systems Compliance and Integrity (Reg SCI, 2014)** – Reg SCI was designed to ensure the resiliency of trading systems by: reducing the occurrence of system issues (glitches, crashes); improving resiliency when problems do occur; and enhancing regulatory oversight and enforcement of market infrastructure technology. It requires design, development, testing, maintaining and surveilling systems for key market functions: trading, clearance, settlement, order routing, data, regulation and surveillance. (We note these were not new procedures for exchanges, which continuously invest in systems and technology, as systems resiliency is important to prevent reputational risk and maintain their business model.) It did put formal rules down on paper – versus the voluntary set of principles followed for the past two decades under the Automation Review Policy (ARP) Inspection Program – and bring a wider focus by all market participants, including regulators, on the importance of market infrastructure.

## Today's Market Resiliency

What was different this time around with the Covid-19 related market turmoil? To assess, we looked at a roughly 30 day time period around each event: Flash Crash from April 15 to May 28, 2010; Covid-19 from March 2 to April 14, 2020. We first look at how volatility differed across the two events. The average VIX during Covid-19 was 2x that of the Flash Crash (54.22 versus 26.79). In fact, the March 16, 2020 peak of 82.69 represents a historical high for the VIX<sup>2</sup>. The Flash Crash peak was 45.79. Covid-19 volatility came in hard and remained elevated for longer.

The impact on index prices differed as well<sup>3</sup>. Looking at intraday price movements (high minus low price), Covid-19 has a higher maximum single-day swing in the DJIA, 1,904 versus 1,010, and on average intraday swings were almost 5x that seen in the Flash Crash. The S&P 500 index saw similar stats, albeit at lower levels of intraday moves: maximum 219 under Covid-19 versus 102 in the Flash Crash; the Covid-19 average was around 5x larger. The Nasdaq moves were more exaggerated, 6.7x greater swings on average for Covid-19 than with the Flash Crash (peak 657 versus 222). The Russell 2000, home to smaller market cap stocks, was essentially out of the Flash Crash turmoil, with a peak intraday swing of 63. It was hit harder under Covid-19, peaking at 140 (3.5x greater on average). (Please see charts on the following pages.)

Covid-19	High to Low				VIX (Price)
	DJIA	S&P 500	Nasdaq	Russell 2000	
Average	1,074	119	338	66	54.22
Minimum	357	47	156	28	31.99
Maximum	1,904	219	657	140	82.69

Flash Crash	High to Low				VIX (Price)
	DJIA	S&P 500	Nasdaq	Russell 2000	
Average	221	25	51	19	26.79
Minimum	58	5	14	4	15.73
Maximum	1,010	102	222	63	45.79

Difference	High to Low				VIX (Price)
	DJIA	S&P 500	Nasdaq	Russell 2000	
Average	4.9x	4.8x	6.7x	3.5x	2.0x
Minimum	6.1x	8.6x	11.3x	6.3x	2.0x
Maximum	1.9x	2.2x	3.0x	2.2x	1.8x

Source: Bloomberg, SIFMA estimates

<sup>2</sup> Please see SIFMA Insights [Spotlight: The VIX's Wild Ride](#)

<sup>3</sup> This analysis looks just at the numbers and does not account for changes to composition of the indexes over the last 10 years

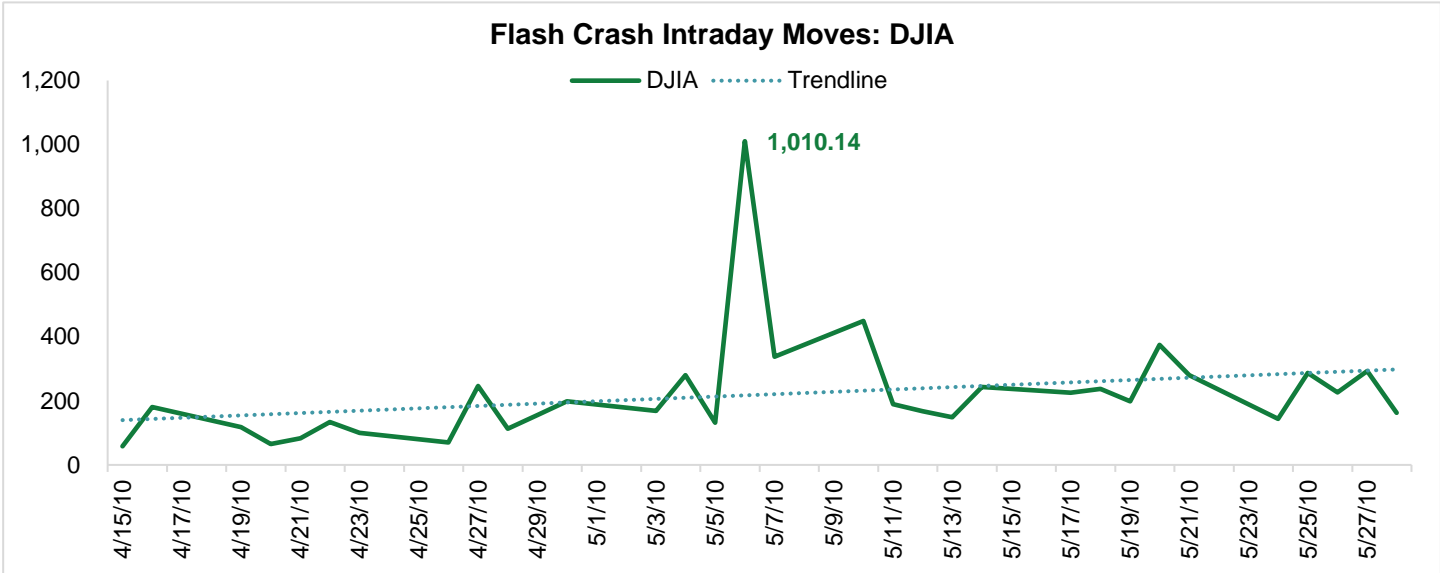
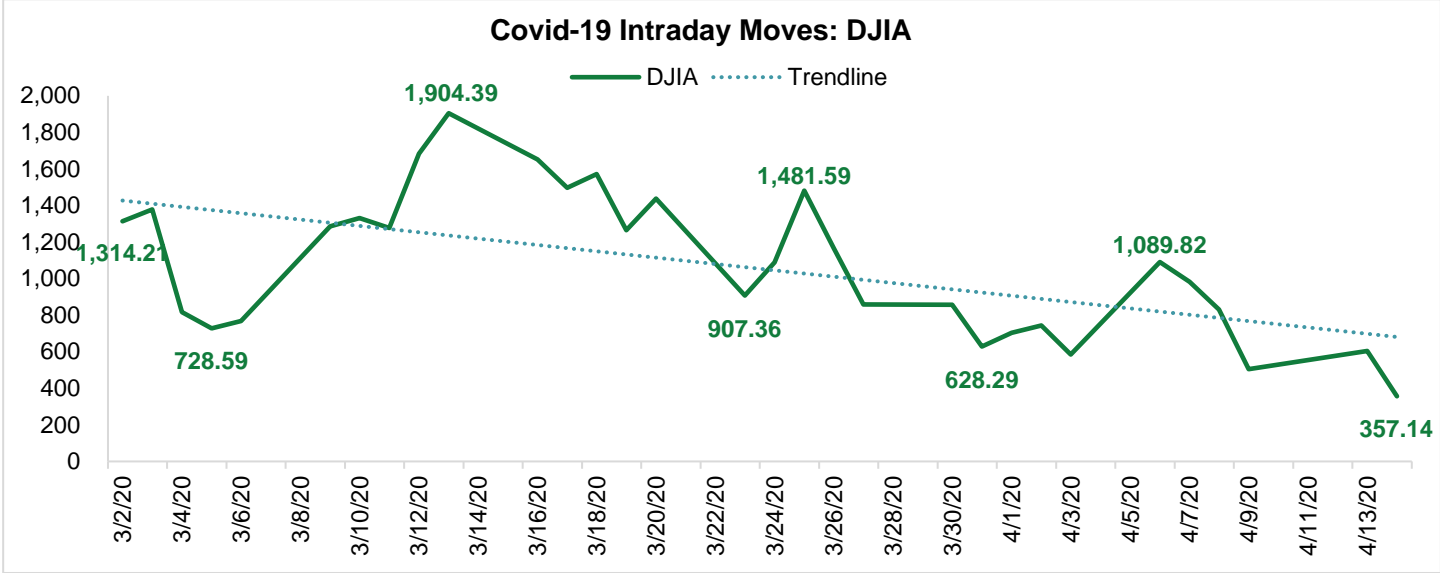
What is also different during the Covid-19 related market turmoil, is that the plumbing of the system has and continues to hold up. Despite greater volatility and price impact, markets remain open and fully functioning, with no exchange experiencing an outage during the peak of the turmoil in March (ADV 15.6 billion shares, average VIX 57.74). Data feeds did not display delays, maintaining the functioning of the price discovery process. MWCBs were triggered four times to address market volatility. The SEC mandated the formation of MWCBs to prevent a repeat of the October 1987 Black Monday crash, where the DJIA fell ~22%. MWCBs have only been triggered once since 1997...until March 2020.

The S&P 500 triggered a Level 1 MWCB during the opening hour on March 9, 12 and 16; the MWCB tripped midday on March 18. (Note: trading also halts on the DJIA and the Nasdaq Composite when a circuit breaker is triggered on the S&P 500.) While there are varying opinions on circuit breakers among market participants, they worked in March, allowing trading to resume efficiently after the trading halt ceased.

Technological improvements over the last decade and regulatory reforms such as Reg SCI are among some of the reasons exchanges are handling the Covid-19 market turmoil so well. That said, given significant changes with the closure of the NYSE, Cboe and other options trading floors, some institutional orders remain unfilled at the close on the NYSE and more options trades are being printed in the OTC market since the trades are too complex to execute in an electronic market. The NYSE also brought in DMMs to manually open recent secondary offerings and IPOs.

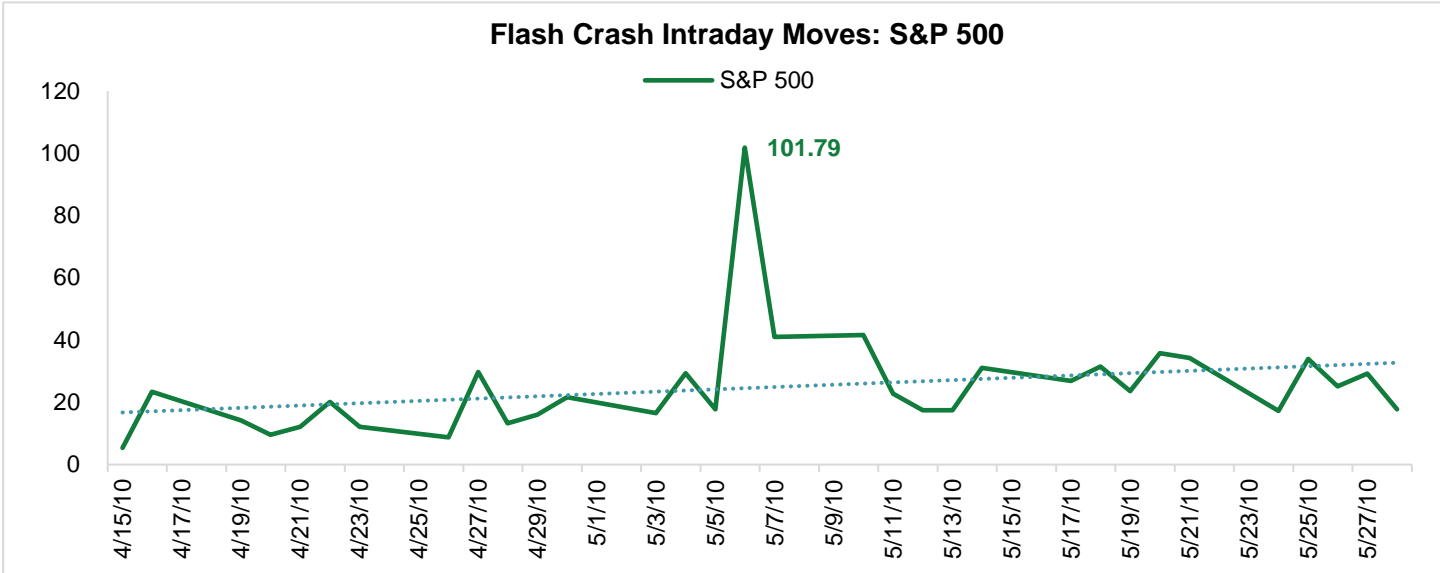
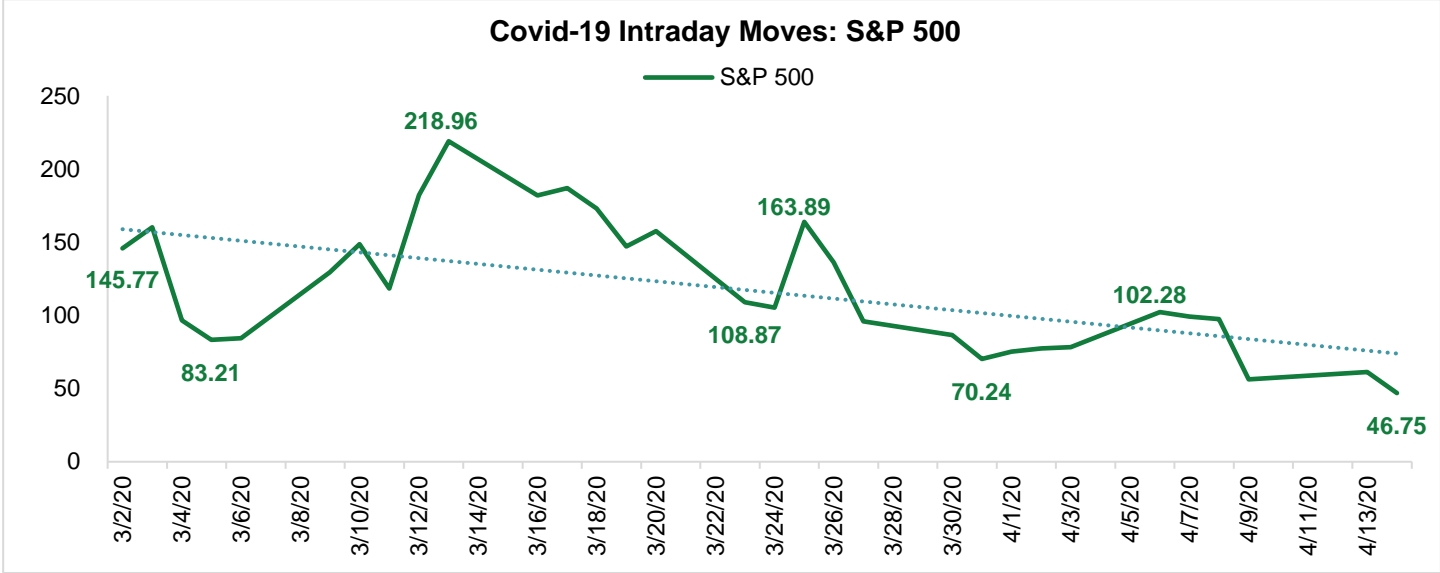
Overall, we still view this as Markets 1: Virus 0. (knock on wood)

Intraday Price Moves (high minus low price): Dow Jones Industrial Average Index



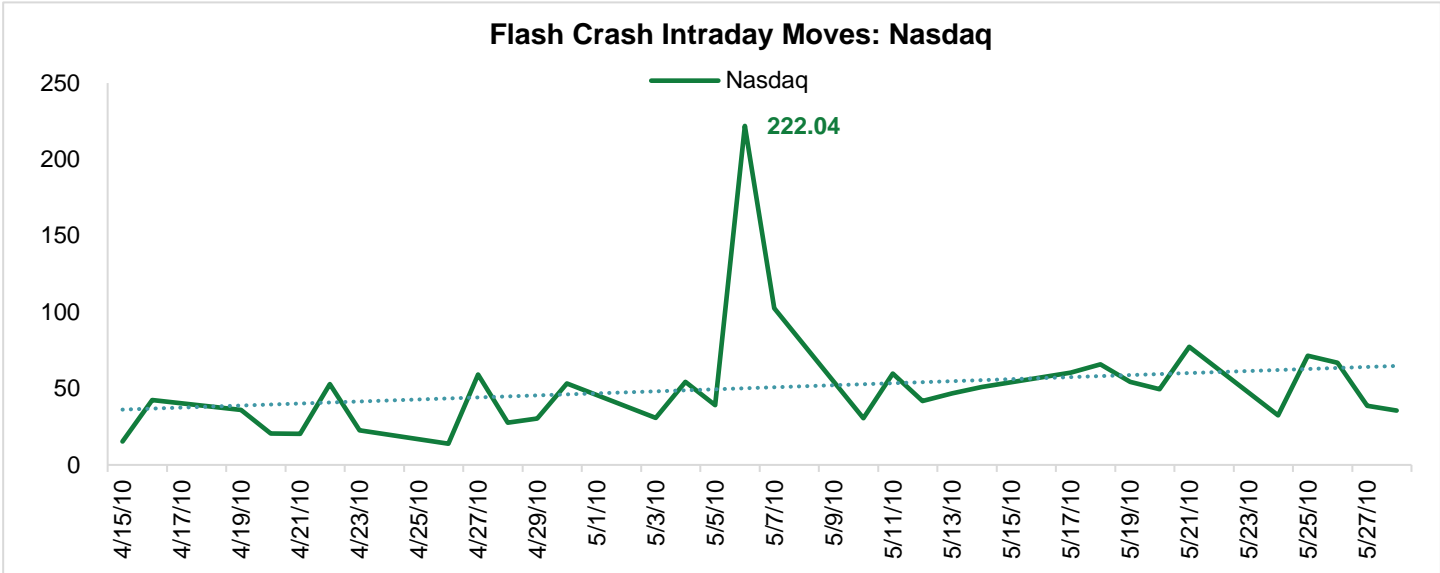
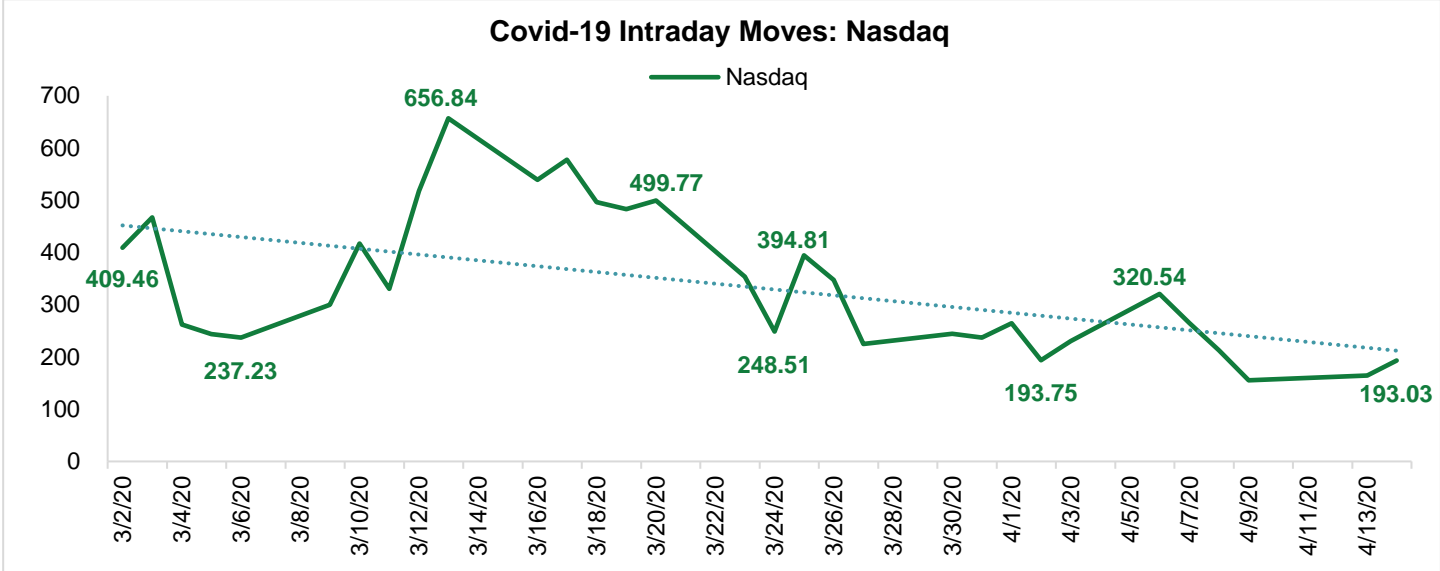
Source: Bloomberg, SIFMA estimates

Intraday Price Moves (high minus low price): S&P 500 Index



Source: Bloomberg, SIFMA estimates

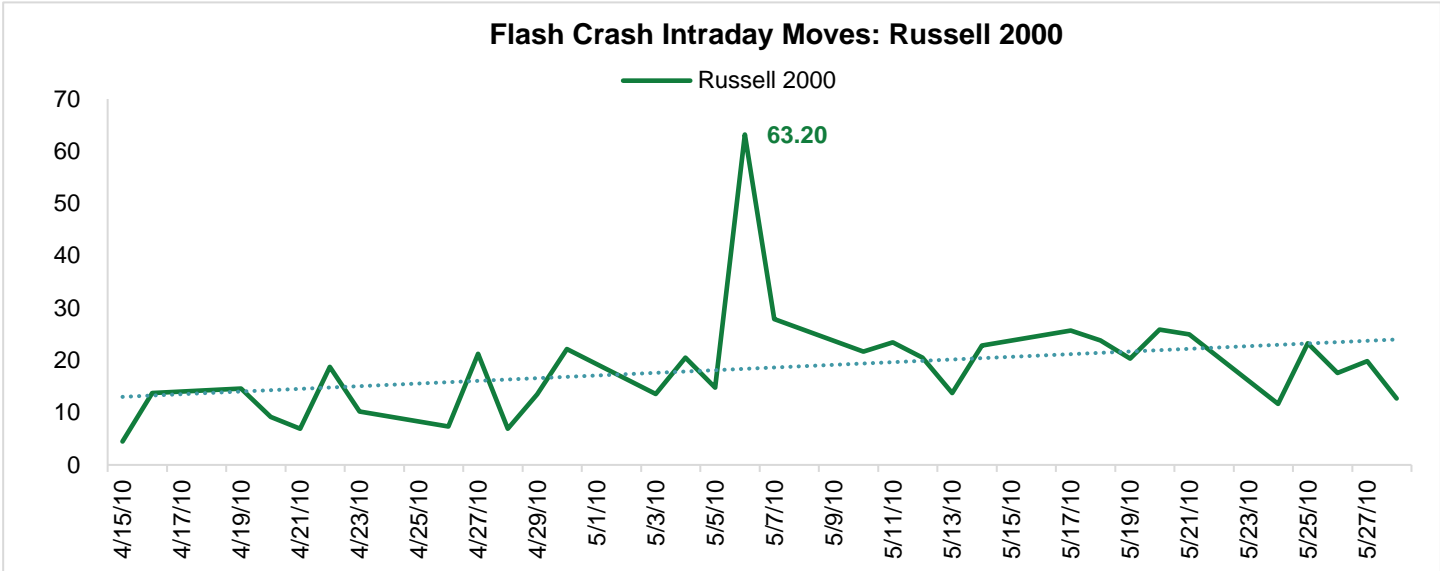
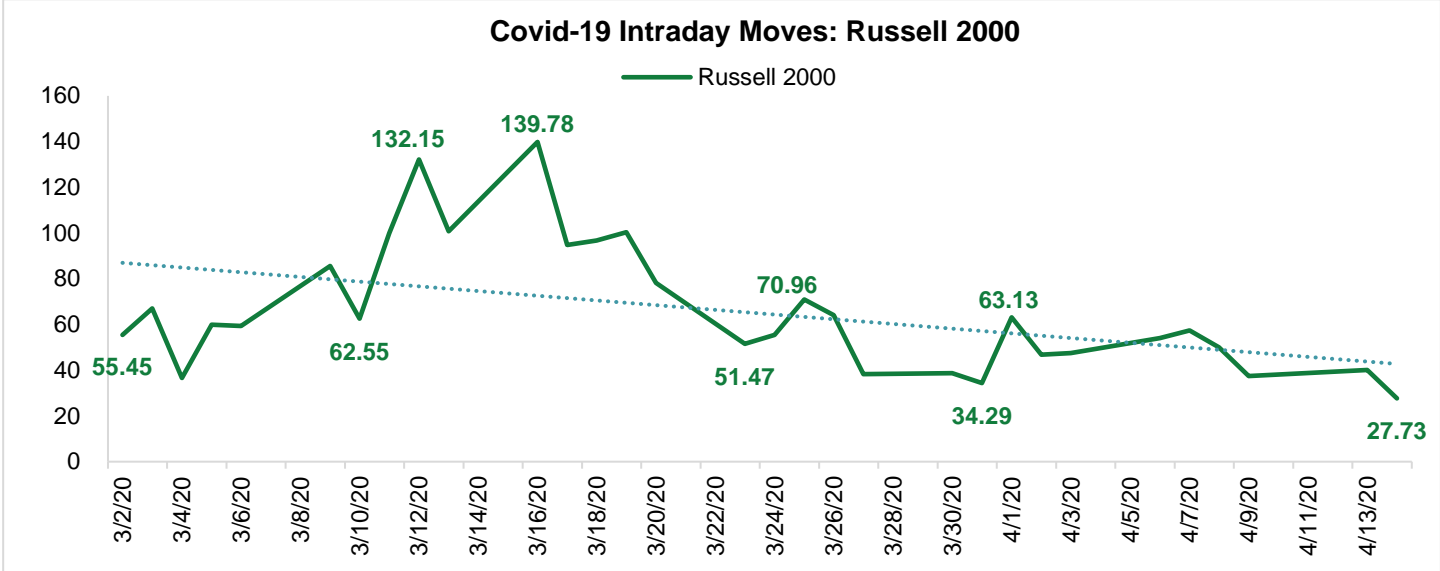
Intraday Price Moves (high minus low price): Nasdaq Composite Index



Source: Bloomberg, SIFMA estimates

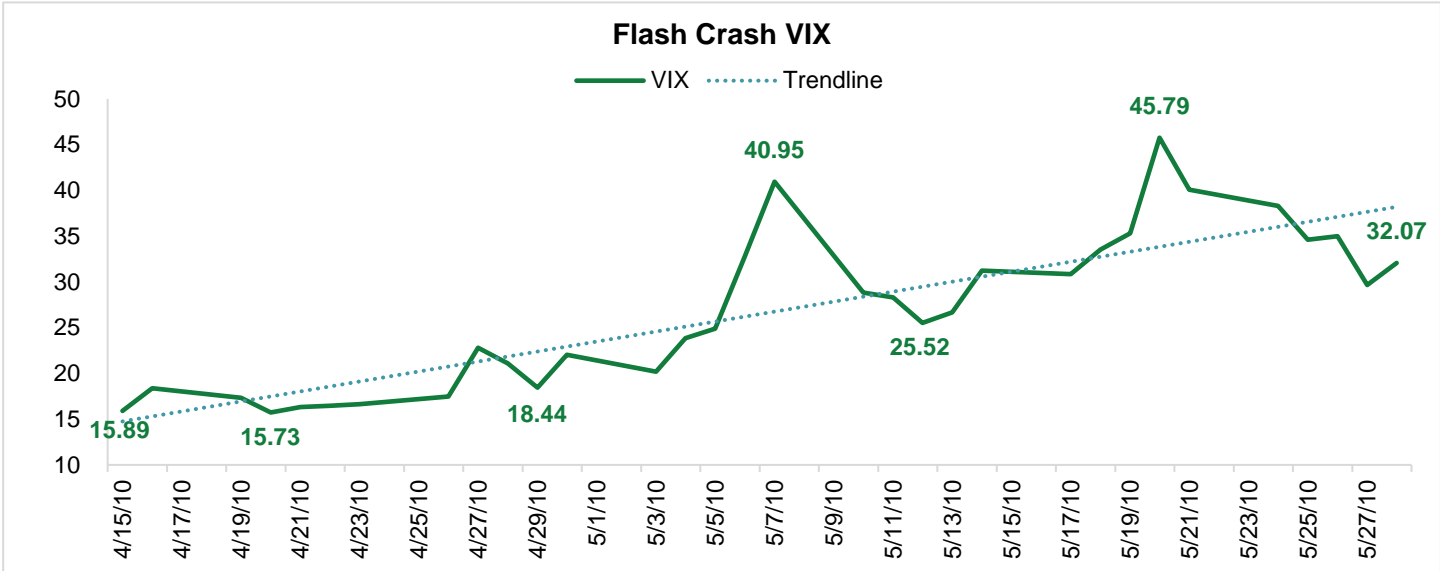
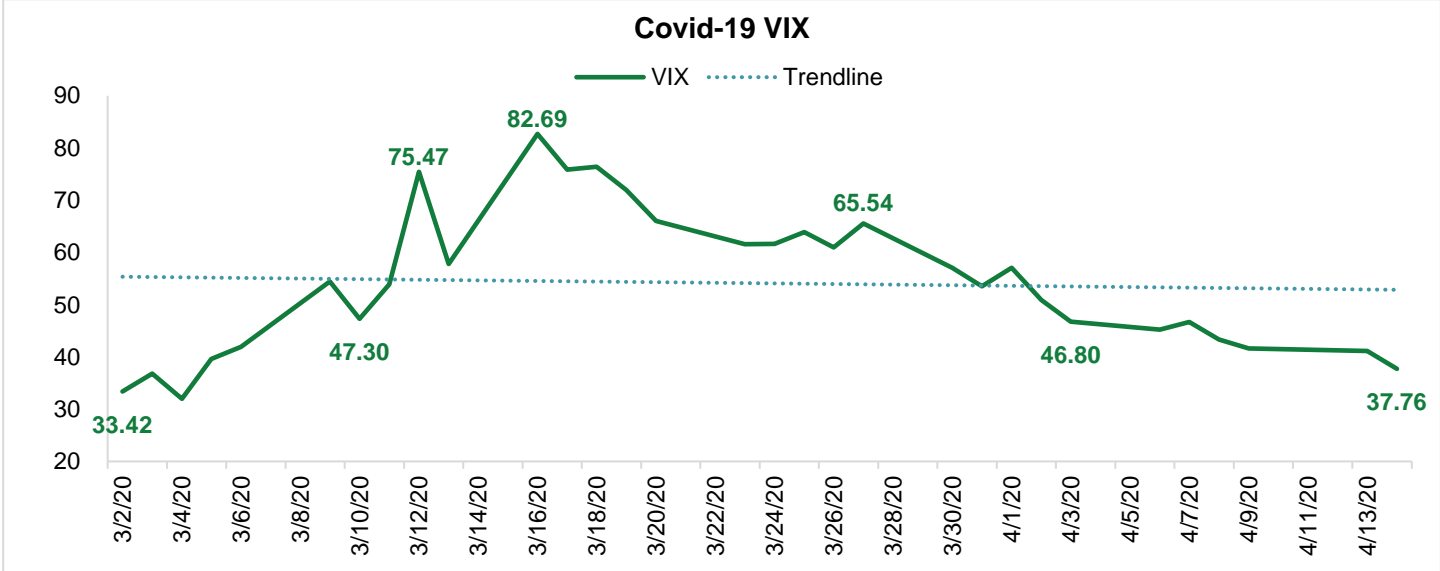


Intraday Price Moves (high minus low price): Russell 2000 Index



Source: Bloomberg, SIFMA estimates

Cboe Volatility Index (VIX)



Source: Bloomberg, SIFMA estimates

## Author

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