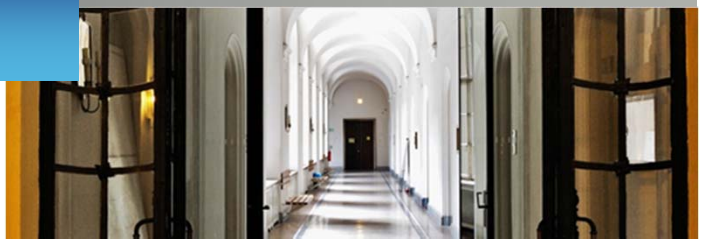
Revisiting the Flash Crash

A Year Has Passed, What Has Changed?



A year ago, on May 6th 2010, one of the most unusual – and puzzling – events in U.S. stock market history occurred. In the afternoon of a trading day that saw U.S. equity prices trending down within normal ranges, the prices of many stocks effectively collapsed during a period beginning shortly after 2:00pm – and then rebounded approximately a half hour later. Bids for the affected stocks essentially evaporated after a series of events converged to significantly disrupt US equity markets. Within minutes, the market price for many securities dropped sharply while many U.S. equity exchange traded funds (ETFs) that were significantly invested in U.S. equities traded at levels that did not reflect their underlying asset values.

The event, of course, became known as the "Flash Crash." In the twelve months since it occurred, regulators, the exchanges, market participants, and others have worked hard to understand what exactly happened and what reforms are needed to prevent a similar occurrence. Meanwhile, ETFs continue to flourish, with total assets of ETFs in the U.S. passing $1 trillion by the end of the year.

The lesson of the event was clear from the beginning: better rules are needed to help protect investors, and to reflect the tremendous evolution that has occurred in the markets in recent years. What has happened since the Flash Crash to reform markets to reduce the risk of another?

While the pace of market reform efforts proceeds slowly, much has been accomplished. Can we say for certain that another Flash Crash cannot occur? No. But the chances of a repeat have been considerably reduced.

In this paper, we review what we know about the Flash Crash and discuss the steps that have already been taken and the proposals still being considered to help prevent a re-occurrence.

The Events of May 6th

Although a definitive cause of the events of May 6th is still unknown, we now believe we have reasonable understanding of some of the causes of sudden price declines that afternoon. The convergence of four factors disrupted U.S. equity markets significantly and resulted in sharp drops in market prices for hundreds of equity securities and U.S. equity ETFs trading at levels that diverged from their underlying asset values.

First, the sudden decline in U.S. equity prices caused market makers in ETFs that seek to track benchmarks dominated by the falling stocks to have difficulty valuing the ETFs' underlying assets. Almost 25% of the components of the Russell 3000 Index suddenly dropped by more than 10% in a matter of minutes (in the year before the Flash Crash the Index had never dropped more than 3% intraday). Market making pricing models began to struggle based on unprecedented market volatility. Market makers' inability to accurately assess the value of ETFs' underlying holdings caused many market makers to discount their bids for ETF shares, leading the market values of those ETFs to then also fall. Next, the NYSE set certain stocks into a "pause" or slow trading mode, which under the then-prevailing rules of the NYSE resulted when trading reached levels known as "Liquidity Replenishment Points." However, trading in these securities continued normally on other equity markets that did not have similar "slow trading" processes, causing additional price uncertainty.

Second, liquidity providers began to fear that normal ETF hedging strategies would be subject to abnormally high risks due to exchange trade cancellation rules, which caused the market makers to pull back from bidding for shares of many ETFs. Many market makers assume the chance of exchanges cancelling trades increases as the market approaches a 10% loss – a level specified as a "reference" in exchange trade cancellation rules – and when there are questions as to the cause of the market drop. Because ETF market makers generally sell shares of an

ETF's underlying holdings as a hedge when buying the ETF's shares, the risk of hedging trades they entered into being cancelled would leave them exposed to being unhedged if they purchased ETF shares in a falling market. As the primary market makers stepped back, other trading firms that normally would base quotes off of the primary market makers had no benchmark quotation to reference, so they too reduced or stopped bids for ETF shares, especially as the ETF shares approached the 10% price decline point. This worsened the liquidity situation.

Third, several other exchanges stopped routing orders to NYSE Arca because they believed the NYSE Arca was not reporting trade executions back in a timely manner. This increased market confusion and introduced the potential for market fragmentation in the event that traders could not find ways to route trades to the market offering the best price. Because ETF trading volume is highly concentrated on NYSE Arca, the disruption in automatic routing of ETF trades to NYSE Arca from other markets with fewer quotes may have made it more difficult for certain ETF orders to access liquidity from market makers who quoted only on NYSE Arca.

Finally, there was additional selling because stop-loss orders were triggered, which increased the volume of sell orders on affected securities, including ETFs. These stop-loss orders, which turned into orders to sell at "market" prices, were executed significantly below trigger points due to the speed of price freefall. Price declines were exacerbated as increased offers to sell coincided with decreased bids coupled with decreased size of bids as large traders pulled out of the market. Thus, in some instances, the price of the ETF fell farther than the basket of the underlying securities.

Although there is a proliferation of theories regarding the Flash Crash, no single definitive cause has been identified. (A report prepared by CFTC and SEC staff highlighted a single large trade in S&P 500 futures contracts, but many questions remain unanswered.) However, there is widespread agreement on the sequence of events. An early theory which misunderstood the Flash Crash – namely, that ETFs caused it – has now been discounted. In fact, ETFs were a victim of, not a cause of the Flash Crash. After all, the ETFs that were affected in the Flash Crash (which generally were only ETFs that were primarily invested in U.S. stocks, the type of underlying securities that experienced plummeting prices that afternoon) felt the impact only following the start of heavy declines in underlying holdings.

BlackRock Recommendations for Equity Market Structure Reform

1. Uniform mechanisms to curb extreme price volatility for stocks and ETFs across all exchanges.
2. Making exchange trade error cancellation rules less arbitrary and more transparent in a manner that does not discourage liquidity providers from providing liquidity at times of market stress.
3. Clearer guidelines for inter-market order routing rules and better coordination among exchanges to reduce likelihood of orders being routed to exchanges with little liquidity or not offering the best price.
4. Thoughtfully revisiting the obligations and roles of lead market makers to help ensure orderly market functioning.

From *ViewPoint* "Understanding the Flash Crash: What Happened, Why ETFs Were Affected, and How to Reduce the Risk of Another", November 2010

Update on Market Reforms

While it took months to sift through the data to determine what actually happened on May 6th – and we still don't know for certain what triggered the Flash Crash – the lesson of the event was clear from the beginning: better rules are needed to help protect investors, and to reflect the tremendous evolution that has occurred in the markets in recent years. What has happened since the Flash Crash to reform markets to reduce the risk of another Flash Crash?

To answer that question, it is helpful to examine the four reforms we recommended in a previous *ViewPoint* "Understanding the Flash Crash: What Happened, Why ETFs Were Affected, and How to Reduce the Risk of Another." In February, the Joint CFTC-SEC Advisory Committee on Emerging Regulatory Issues, a body created by legislation to investigate the Flash Crash, issued a report. The report recommends fundamental changes in U.S. equity market structure and endorsed many of our recommendations. The following is an update on our recommended reforms:

1. Uniform mechanisms to curb extreme price volatility for stocks and ETFs across all exchanges. Such mechanisms could include individual stock circuit breakers or, alternatively, price bands (limits on price movements similar to those employed in futures markets). Such mechanisms should, in theory, help to curb sudden and extreme disruptions.

On April 5th, the SEC in conjunction with FINRA and the exchanges released their "limit up – limit down" proposal to introduce uniform price bands. Each security, depending on whether it is classified as a Tier 1 or Tier 2 security, will have a lower and upper band through which trading cannot take place on any U.S. equities market. For Tier 1 stocks, which include those in the S&P 500 and Russell 1000 Indexes and 344 ETFs, the upper and lower band will be 5% based off of the average price of the security during the preceding 5 minutes. For Tier 2 stocks which are all other securities, the upper and lower band will be 10%. If these bands are reached and all orders on the band limit are not either cancelled or executed within 15 seconds, then there will be a 5 minute trading halt to allow traders to adjust prices and to match buy and sell orders at a new price level.

2. Making exchange trade error cancellation rules less arbitrary and more transparent in a manner that does not discourage liquidity providers from providing liquidity at times of market stress.

For stocks subject to the pilot program as described above, those that are priced under $25 would have their trades canceled when their values came within 10% of the circuit breaker trigger price. For stocks priced between $25-$50, trades would be canceled when their values came within 5% of the trigger, and for stocks above $50, trades would be canceled when their values came within 3% of the trigger. Guidance was also issued for situations when circuit breakers are not applicable and multiple stocks are involved. For events involving 5-20 stocks, trades would be canceled when their values came within 10% of the last traded price. For events involving 20 or more stocks, the band would be 30%.

3. Clearer guidelines for inter-market order routing rules and better coordination among exchanges to reduce likelihood of orders being routed to exchanges with little liquidity or not offering the best price.

The Summary Report by the Joint CFTC-SEC Advisory Committee recommended that the SEC "study the costs and benefits of alternative routing requirements." Under consideration would be a "trade at" routing regime as well as a review of the "top of book" protection. A "trade-at" rule would mean that any trades executed off an exchange – specifically dark pools and internalization venues – would have to be executed at a better price then the current NBBO (national best bid/best offer). "Top of book" means that only the best bid or best offer on an exchange needs to be honored. "Depth of book" would mean all limit orders on an exchange would have to be honored.

To be clear, currently there is no "trade-at" rule and no "depth of book" protection. This topic is now under consideration with no set time or plan for implementation. However, we believe this proposal should be analyzed closely to ensure that it does not result in unintended consequences.

4. Thoughtfully revisiting the obligations and roles of lead market makers to help ensure orderly market functioning.

The Summary Report by the Joint CFTC-SEC Advisory Committee made two recommendations regarding the incentives and obligations of market makers. One was "to evaluate whether incentives or regulations can be developed to encourage persons who engage in market making strategies to regularly provide buy and sell quotations that are 'reasonably related to the market.'" The other was to see if it was feasible to build incentives for market makers to continue to bid for securities during times of high volatility. Currently, both of these are only recommendations with no set time or plan for implementation.

It should be noted that the possibility of stocks trading based on "stub quotes" of $0.01 from market makers, which happened during the Flash Crash, has now been greatly reduced. There was previously no guidance around minimum quoting standards for market makers who had to maintain two sided markets. They would thus employ "stub quotes" which are offers to buy or sell a security at a substantial distance away from the NBBO with no intention of execution. For example, for shares of an ETF trading at $40, a market maker could bid $0.01 and ask $1000 for 1000 shares in order to maintain a quote without attracting trading volume. In the absence of any higher bid, many sell orders "at market" were matched against stub quotes during the Flash Crash.

The SEC eliminated stub quotes and implemented new rules forcing market makers to maintain continuous two-side quotations that are within a defined percentage around the NBBO. For the securities that are part of the circuit breaker pilot program, the upper and lower band is 8% during normal trading hours.

Conclusion

The ETF industry, and in particular we at BlackRock, have worked with regulatory and industry partners over the past year to develop a framework for market reforms. Much work has been done, and there is essentially universal agreement on the need to make market structure as modern as the markets themselves. Looking back, it is worth highlighting the progress that has been made.

The SEC proposed a rule for the self-regulatory organizations (SROs) to establish a consolidated audit trail system that would allow regulators to track all of the information related to trading orders received and executed across the securities market. As the SEC noted in its announcement, "this will help the regulators keep pace with the new technology and trading patterns in the markets."

The new circuit breakers and "limit up – limit down" guidelines are intended to inhibit the steep price drops that were experienced during the Flash Crash. Clearly defined trade cancellation rules will prevent market makers from having to worry that one side of their trade may be broken. A consolidated audit trail will give the regulators the tools necessary to monitor trading patterns across multiple exchanges. However, "mini flash crashes" can still happen today when large market orders are entered without sufficient liquidity on the other side. Thus, it is imperative that the investor understands the product, reviews its market, and enters orders at appropriate price limits – a market order to sell that exceeds the size of the consolidated bid could get executed at any price within the newly defined bands.

Many of the other market reform proposals, including the "trade at" routing regime and the cancellation of high frequency trading are major changes to the current market structure. As such, they need more analysis to ensure that they don't have unintended consequences.

All in all, the safeguards and reforms that have been implemented will help slow down a potential future market disruption similar to the Flash Crash. However, these changes have not eliminated the possibility that another Flash Crash could occur.

Creating the right balance of reforms going forward will admittedly be challenging. We need a sensible combination of incentives and obligations for market makers, and trading rules that may slow market activity, but limit damage in the event of market disruption. Of course, we will never eliminate risk entirely from the markets – nor should we. But we have come far in preventing another Flash Crash, and if market participants and regulators continue to work together, we can do even more.

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