

## US EQUITY MARKET STRUCTURE: LESSONS FROM AUGUST 24

OCTOBER 2015

### Introduction

The events in the US equity market on August 24, 2015 marked the first true opportunity to assess the efficacy of reforms implemented in response to the 2010 “Flash Crash”,<sup>1</sup> such as individual stock trading halts, policies to address erroneous transactions, and the market-wide circuit breaker. For most of the day, the market functioned and remained accessible to investors at record-setting trading levels and volatility. But, during the first hour of trading, a tumultuous US market open precipitated rapid, anomalous price moves in many stocks, exchange-traded products (ETPs), and closed-end funds (CEFs). This *ViewPoint* examines the events of that first hour.

August 24 reminds us that we live in a world of increasing volatility, as technology and many other dynamics impact capital markets from equities to fixed income. For example, it was only a year ago that we experienced the Treasury “Flash Rally” on October 15, 2014. With the recognition that moments of high volatility and discontinuous pricing may be a persistent aspect of today’s markets, we see a need for market participants, exchanges, and regulators to improve the US equity market’s ability to cope with extraordinary volatility.

In this *ViewPoint*, we discuss the lessons from August 24 and analyze the brief breakdown in the arbitrage mechanism for many US-listed ETPs that invest in US equities. We believe that the industry and regulatory response should first focus on facilitating the free flow of pricing and order information across the US equity market ecosystem. We share recommendations to refine trading mechanisms and “guard rails” to enhance the resiliency of the US equity market, which we believe will promote fair and orderly markets and benefit the functioning of both ETPs and individual stocks. As discussed throughout this *ViewPoint*, proposed improvements must balance attempts to improve market resiliency with the preservation of the existing and well-functioning processes through which equity securities are traded today.

### Recent Volatility in the US Equity Market

In late August 2015, the US equity market experienced a rapid spike in volatility as global market sentiment weighed bearishly on stocks. During that period, the VIX volatility index doubled<sup>2</sup> and equity trading volumes surged as investors reassessed global growth prospects and inflation expectations.

Market activity on August 24 was particularly extreme. Before the market opened, global equity markets were down 3% to 5% and the e-mini S&P 500 future was limit down 5% in pre-market trading before wider price curbs went into effect at 9:30am.<sup>3</sup> Due to these pre-opening factors, the morning began under selling pressure with substantial order imbalances at the open as investors reacting to global macro concerns flooded the marketplace with aggressive orders to sell (that is, orders to sell without any restrictions as to price or timeframe such as market and stop-loss sell orders). According to the New York Stock Exchange (NYSE), the volume of

# BLACKROCK®



**Barbara Novick**  
Vice Chairman



**Richard Prager**  
Head of Trading &  
Liquidity Strategies



**Hubert De Jesus,**  
Co-Head of Market  
Structure and  
Electronic Trading



**Supurna VedBrat**  
Co-Head of Market  
Structure and  
Electronic Trading



**Martin Small**  
US Head of iShares



**Samara Cohen**  
US Head of iShares  
Capital Markets



**Ananth Madhavan,**  
PhD, Global Head of  
Research for iShares



**Alexis Rosenblum**  
Government Relations  
& Public Policy

## EXECUTIVE SUMMARY

### *Contributors to disruptions on the morning of August 24:*

#### **1. A confluence of US equity market issues exposed structural flaws that impeded the flow of order and pricing information, halted trading, and delayed the open for various securities.**

- ▶ Widespread selling pressure led to pre-market price declines in futures and a surge in market orders.
- ▶ Almost half of New York Stock Exchange (NYSE)-listed equities had not opened by 9:40am.<sup>4</sup> Exchange rules limited pre-open pricing information on those securities.
- ▶ Many stocks that opened on time began trading at abnormally low levels (e.g., down 20%).
- ▶ Trading in hundreds of securities was repeatedly halted by Limit-Up Limit-Down (LULD) rules, including 773 Limit Up halts and 505 Limit Down halts.<sup>5</sup>

#### **2. The US equity ETP arbitrage mechanism was temporarily impaired due to disruptions stemming from the above issues.**

- ▶ ~20% of US-listed ETPs were halted from trading at some point during the day.<sup>6</sup>
- ▶ ETPs depend on market makers to arbitrage price discrepancies between share price and underlying portfolio value. Market makers in US equity ETPs, in particular, required near-100% price transparency across the US equity market to determine when arbitrage opportunities were available and implement hedges.
- ▶ Arbitrage ceased temporarily on many US ETPs amid the lack of price indications, widespread anomalous single stock pricing, uncertainty around hedging due to fear of “broken trades,” delayed opens and trading halts in many stocks. The result was price dislocations or disparate behavior between comparable ETPs, similar to the experience of individual stocks.
- ▶ The issues were primarily concentrated in US-listed ETPs that invest in US equities.<sup>7</sup> US-listed ETPs that invest in non-US equities or bonds and ETPs listed in other countries generally traded normally.
- ▶ After the first hour, the market and ETP arbitrage functioned well. August 24 was the second-highest trading day in US equity history; ETPs comprised 37% of that flow.<sup>8</sup>

#### **3. Excessive use of market and stop-loss orders that seek “liquidity at any price” inflamed the situation.**

- ▶ When markets are volatile, liquidity can come at a cost.
- ▶ Market and stop-loss orders that demand “liquidity at any price” added to selling pressure and proved especially risky on the morning of August 24.

### *Recommendations for enhancing US equity market resiliency:*

There is no “silver bullet” or single solution to the issues observed on August 24. We believe all of these recommendations are important and should be considered holistically.

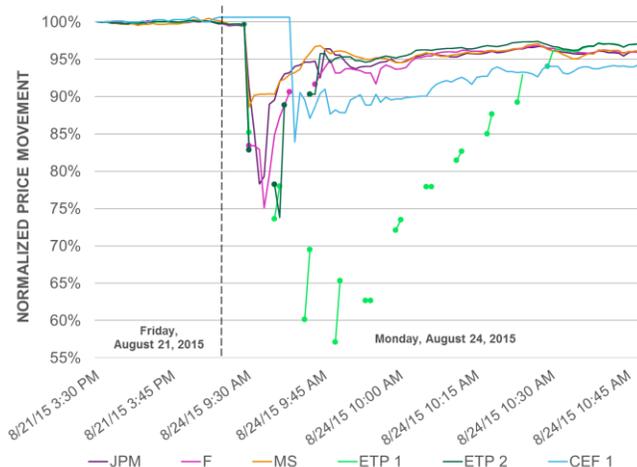
- 1. Harmonize trading rules among futures, options, individual stocks, and ETPs.** Any new rules should be designed consistently across the equity market ecosystem and its individual components, including cash equities, listed options, futures, and ETPs, as well as their associated regulatory regimes. Discordant rules create complexity, conflicts, and increased risk of regulatory arbitrage.
- 2. Recalibrate Limit-Up Limit-Down (LULD) rules.** Apply a consistent price band throughout the day (instead of wider bands at the open and close). Policy makers and market participants should work together to recalibrate LULD rules by identifying the optimal combination of trading pause and limit state. Align LULD rules for futures, individual stocks, options, and ETPs, recognizing linkages across markets. Recognize limitations of LULD during market-wide events.
- 3. Consider revising market-wide circuit breakers.** Assess whether lower thresholds that would be tripped more frequently than the current thresholds (such as thresholds that would be tripped annually) would enhance the market’s ability to respond under stress. Second, add a market-wide circuit breaker that would be triggered if a significant number of individual securities are halted or disrupted (further analysis needed to determine the appropriate thresholds).
- 4. Ensure transparency and timeliness of the primary market open.** Extend automated pre-open imbalance data feeds until each stock opens when NYSE Rule 48 is in effect. Revise auction collars and consider moving to further automated opening procedures to ensure continuity and completeness of information.
- 5. Eliminate uncertainty in the determination of “clearly erroneous” trades.** Create clarity of “erroneous” pricing by aligning definitions with LULD rules – so prices executable on an exchange are inherently valid trades.
- 6. Issuers (of both stocks and ETPs) should be proactive in considering an exchange’s auction processes and trading rules before listing their securities.** Issuers should ensure that exchanges have procedures that promote fair and orderly markets in their securities. ETP sponsors and public companies can shape better outcomes by engaging with exchanges to prioritize market structure improvements that protect investors and discourage disruptive activity.
- 7. Educate investors on how to navigate the modern US equity market.** Customer-facing broker-dealers should consider whether there is more to do to raise investor awareness regarding usage of market and stop-loss orders in volatile periods, especially at the open or close.

market orders on August 24 was four times the number of market orders observed on an average trading day. Extensive use of market and stop-loss orders overwhelmed the immediate supply of liquidity, leading to severe price gaps that triggered numerous LULD trading halts.

The confluence of these factors contributed to aberrant price swings and volatility across the US equity market. For example, the S&P 500 index was at a low, down 5.3%, within the first five minutes of trading, then rallied 4.7% off the lows before selling off again late in the session to close down 3.9%.<sup>9</sup> Bellwether stocks such as JP Morgan, Ford, and General Electric saw temporary price declines in excess of 20%.<sup>10</sup> As shown in Exhibits 1 and 2, individual stocks as well as ETPs and CEFs experienced significant dislocations after the opening followed by unusual volatility.

### Exhibit 1: PRICE BEHAVIOR FOR INDIVIDUAL STOCKS, ETPS, AND CEFS ON AUGUST 24

The below chart shows price behavior for representative individual stocks, ETPs, and CEFs.



Source: Bloomberg. Data reports the lowest price at each minute interval and is normalized relative to the closing price on August 21.

### Transparency and Information Flow

Price transparency and information flow in the US equity market were curtailed from the start, forming one of the key contributors to the day's events. Anticipating widespread volatility, NYSE invoked Rule 48 prior to the open. NYSE Rule 48 suspends the requirements to make indications regarding a stock's opening price and to seek approval from exchange floor officials prior to opening a stock.<sup>11</sup> By suspending time-consuming manual procedures, this action should have permitted Designated Market Makers (DMMs) to open stocks more quickly and effectively. However, this rule had the unintended effect of limiting pre-open pricing information in securities, especially for any stocks experiencing delayed opens. Although DMMs actively worked to facilitate a prompt open for all securities, the opening auction was considerably delayed for an extensive

number of stocks. At 9:40am, nearly half of NYSE-listed equities had yet to begin normal trading.<sup>12</sup> These delays, along with the absence of pre-open indications, impeded the normal flow of information which market makers and other participants rely upon to perform their customary activities with respect to the market open.

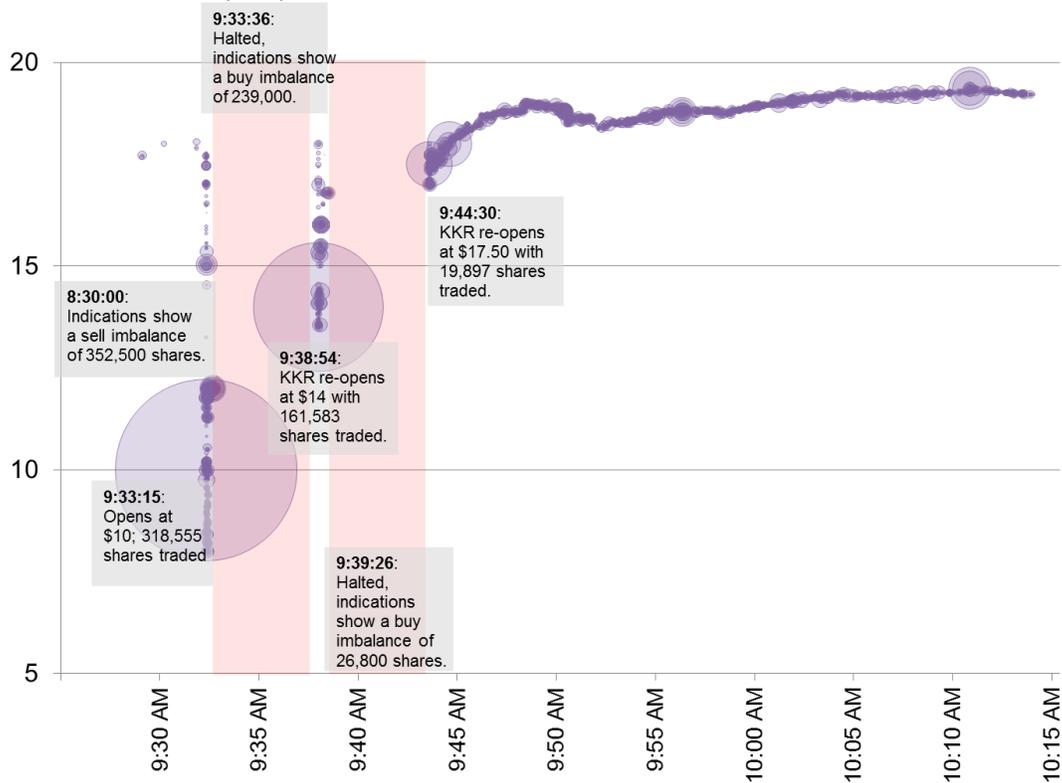
Without this information, and with many securities experiencing delayed openings, correlations snapped with prices for securities in the same industry or ETPs tracking identical benchmarks deviating significantly from one another. In financials, for example, JP Morgan experienced a sharp decline, while Morgan Stanley did not. The basis between futures and cash prices for the S&P 500 index also widened considerably – futures traded at a 1.66% discount to the corresponding equity basket.<sup>13</sup> These dislocations heightened uncertainty in the market because the validity of automated pricing models becomes challenged when there are meaningful disparities between the prices of normally correlated securities. Additionally, since many of the computerized processes which support market making rely on futures as a reference asset, the ability of market makers to efficiently allocate capital and price risk was inhibited. Market makers faced further uncertainty on the cancellation of potentially "erroneous trades", adding to their reluctance to trade. As we explain in detail in the ETP section, the lack of price transparency impaired the ETP "arbitrage mechanism" because market makers were unable to rely upon price information for individual stocks to determine when arbitrage opportunities exist between the ETP and its underlying basket, and to hedge their positions. In the absence of the necessary data, many market makers ceased arbitraging US equity ETPs.

### Limit Up-Limit Down Rules

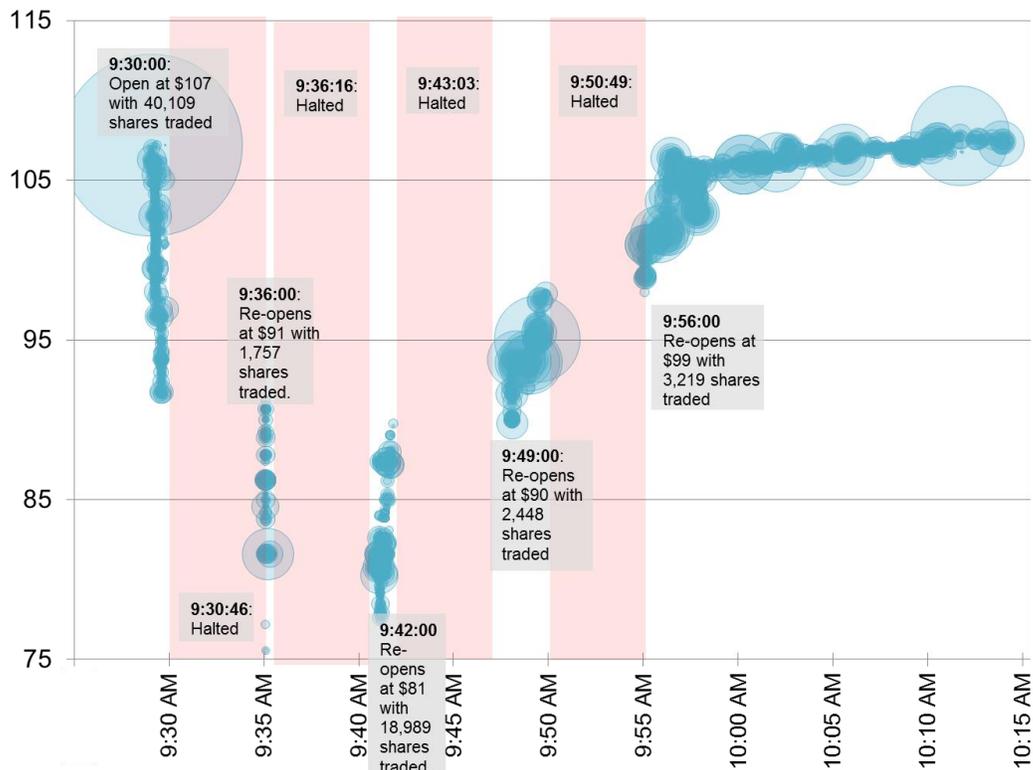
Limit Up-Limit Down rules were originally conceived as a reform in response to the 2010 Flash Crash to serve as circuit breakers or mechanisms to mitigate extreme price volatility in individual stocks by halting trading for a period of time when a price threshold (known as a "price band") is reached. LULD rules were designed to address single security situations (e.g., "fat finger" or news events) but were not necessarily expected to be invoked in broad market scenarios where hundreds of securities undergo LULD trading pauses at the same time. Unfortunately, this was the case on August 24, when nearly 1,300 LULD trading halts occurred due to the market swings.<sup>14</sup> These pauses effectively curbed sharp price moves on the way down; but as liquidity replenished and price anomalies were discovered, the same rules delayed the ensuing price recovery as the trading halts continued to be applicable when prices fell and when prices rose. Due to both the duration and sheer volume of halts, LULD rules may have inadvertently impeded market transparency, since price discovery is constrained when securities are halted. Further,

## Exhibit 2: INDIVIDUAL STOCKS AND ETPS EXPERIENCED SIMILAR ISSUES ON AUGUST 24

### Representative Individual Stock (KKR)



### Representative ETP



Source: TAQ, Nasdaq. For illustrative purposes only. Width of bubbles represents volume for each individual trade. Note that some of the reopening trades in the ETP example are reported individually instead of as a block transaction meaning that there are multiple small bubbles instead of one large bubble as shown for the opening.

market makers needed to reinstate their automated pricing systems manually to resume trading once the trading halts were lifted. These manual and time-consuming modifications added to the disruption as many firms were not staffed to handle the volume of trading halts that occurred on August 24.

### Exchange-Traded Products

The market forces discussed above led to a temporary breakdown in the arbitrage mechanism of many ETPs. 327 ETPs experienced LULD halts on August 24.<sup>15</sup> Many ETPs also experienced brief periods where they traded at significant discounts to the value of their underlying portfolio holdings. As a result, the events of August 24 left many investors dissatisfied with the prices at which trades were executed and raised concerns about the functioning of markets and ETPs. Further, like individual stocks, the confluence of order imbalances, lack of information flow, and opening issues contributed to differing experiences, even for comparable ETPs. Retail investors who had standing stop-loss orders were especially impacted – once the stop price was reached, the orders were converted into market orders, which were often executed at prices that were markedly lower than the stop price (see Exhibit 11 for an explanation of the various order types). As stop-loss orders are typically intended to be used to mitigate losses, investor education about the risks of stop-loss orders should be significantly increased, as discussed on page 13 under “Investor Education”.

**Auction Constraints.** Many ETPs experienced severe price moves after the open or the re-open following a trading halt. This phenomenon was heavily influenced by the size of the NYSE Arca auction collars, which prevent the auction price (e.g., opening price or price after a halt) from executing outside of a specified price range. Over 85% of US ETPs are listed on NYSE Arca, so the rules and mechanisms on this specific exchange have an inordinately pervasive impact on the trading activity observed in ETPs.<sup>16</sup> The auction collars in effect on August 24 were 5% for securities priced from \$0.01 to \$25.00, 2% for securities priced from \$25.01 to \$50.00, and 1% for securities priced greater than \$50.00.<sup>17</sup> For example, for an ETP whose last price was \$100, the auction collar would have been \$99 to \$101. Normally, these collars ensure that a security does not open materially away from the last trade. However, in volatile markets when there are material imbalances of buying or selling, restrictive price collars can constrain the auction price and result in significant unfilled residual demand, which is then released into the order book. The ensuing order imbalance amplifies volatility and acutely increases the likelihood of an immediate LULD halt following an auction. Indeed, this was the result on August 24, as a substantial number of the ETP trading halts were initiated within the first minute of trading after the opening auction or resumption of trading following a LULD pause (see Exhibit 3).

**Exhibit 3: AUGUST 24 LULD HALTS BY TIME FROM START OF TRADING AND EXCHANGE**

Trading Time Elapsed	BATS	NASDAQ	NYSE	NYSE Arca	NYSE MKT
< 1m	2	57	11	520	1
1-5m	1	30	15	242	0
5-15m	0	25	10	96	0
>15m	0	82	42	141	3

Source: TAQ.

**“Arbitrage Mechanism”.** The experience of ETPs, in part, reflects that ETPs are more reliant than individual stocks on market makers to keep the price of the ETP aligned with the value of its underlying holdings. Market makers typically will buy ETP shares trading at a discount to the value of the ETP’s underlying holdings in order to earn arbitrage profits. Under most conditions, this activity keeps the ETP share price closely aligned with the value of the underlying holdings. If this “arbitrage mechanism” is temporarily disrupted, the ETP will trade similarly to a closed-end fund, which may entail significant discounts or premiums as observed on August 24. ETP arbitrage is facilitated by the fact that the value of most ETP shares normally can be readily compared to the value of the ETP’s holdings. This allows market participants to act swiftly when the exchange price of an ETP’s shares deviates from the current value of the ETP’s underlying holdings. This “arbitrage mechanism” incentivizes authorized participants (APs)<sup>18</sup> to create or redeem ETP shares in a manner that adjusts the supply of outstanding ETP shares to match market demand. As a result, the ETP’s share price on the exchange is usually aligned with the value of the ETP’s underlying holdings. An effective ETP arbitrage mechanism requires the combination of several distinct factors, which we group into three<sup>19</sup> broad categories:

- (i) *Valuation clarity* is the ability to value ETP shares and requires that the current intrinsic value of the ETP’s portfolio holdings can be determined intraday without substantial uncertainty.
- (ii) *Access* relates to market participants’ ability to provide liquidity by means of arbitrage trades when discrepancies arise between an ETP’s intrinsic underlying portfolio value and the price of the ETP’s shares. To do so, market participants generally require the ability to construct a hedge that offsets the risks of being long or short an ETP’s shares. As such, if market makers and other market participants are unable to hedge a position in an ETP’s shares, they will not commit capital to provide liquidity in such shares.
- (iii) *Certainty of execution* refers to the confidence that market participants require regarding whether both their ETP

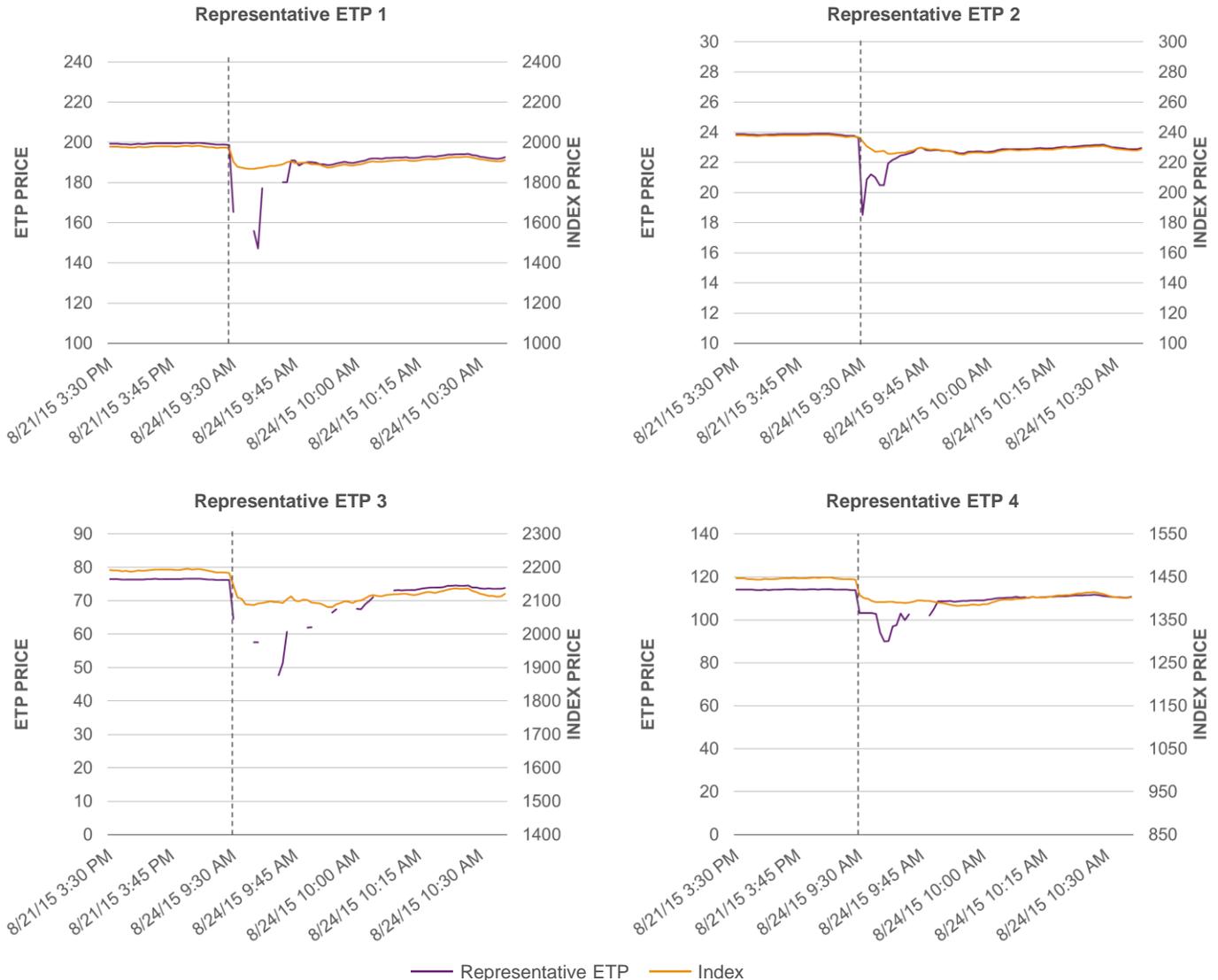
trades and associated hedge trades will stand or whether they will be exposed to unhedged risks if some portion of the trades are cancelled. When securities are able to trade at prices which may fall within erroneous trade guidelines, certainty of execution is absent and market makers may be inclined to reduce trading activity rather than potentially be exposed to unhedged risks from subsequent trade cancellations.

On August 24, a combination of factors impacted market makers. Seeing an absence of quotations or price indications on many ETP portfolio holdings, unable to effectively hedge due to LULD halts, and lacking clarity regarding erroneous trades, market makers were temporarily unable to participate in the “arbitrage mechanism” to align prices properly for a number of ETPs. Further, most ETP market makers depend

on specific price information on the underlying securities, which precluded them from performing their regular function while this price information was not available.<sup>20</sup> These factors contributed to the dislocation observed in some ETPs’ prices as shown in Exhibit 4.

After 10:30am, market pricing began to function properly for individual stocks and ETPs as opening delays were resolved, information flow about order imbalances was restored, and LULD halts gradually expired. Trading throughout the day reflected both unusual volatility and higher than normal volume. By day’s end, over \$630 billion and 14 billion shares changed hands, marking August 24 as the second highest day by value traded in history.<sup>21</sup> ETPs played a large role in trading that day, making up 37% of all US trading or \$270 billion for the day.<sup>22</sup>

**Exhibit 4: TEMPORARY PRICE DISLOCATIONS IN REPRESENTATIVE ETPs (USD)**



Source: Bloomberg. Note primary and secondary axes use different scales.

## Market Making 101: Who Provides Liquidity To The Market?

There are a variety of liquidity providers in modern equity markets as the landscape has changed strikingly over time. Traditionally, the function was performed by broker-dealers, exchange specialists, or designated market makers (DMMs). However, regulations, advances in technology, broker-dealer balance sheet constraints, and market complexity have advantaged faster and more electronic participants. Today, market making is primarily conducted by electronic market makers and high frequency arbitrageurs, collectively known as proprietary trading firms.

Market makers facilitate the exchange of securities between end-investors by bridging the gap between the time when natural buyers and natural sellers enter the market. A willing buyer of a given stock is unlikely to simultaneously arrive in the market as a willing seller, much less agree on price. Liquidity providers intermediate the transaction between the buyer and the seller, and by performing this valuable function they provide immediacy of execution to investors.

Exchange-registered market makers have responsibilities to maintain fair and orderly markets and continuously quote on a two-sided basis in their securities. That said, their obligations are not unlimited. For instance, NYSE DMMs

are only required to quote at the National Best Bid or Offer (NBBO) for 10-15% of the trading day. When they are not quoting the best bid or offer, their quotation can be as wide as 8% away from the last reported sale.<sup>23</sup> Additionally, the majority of other participants that provide liquidity to the market are not subject to any obligations to make markets.

This is important to note because in times of extreme stress, market makers do not “support” the market. They are not buyers of last resort. Because market makers must manage their risk and maintain adequate capital, their capacity can be overwhelmed in the face of broad-based and unabated buying or selling. During periods of market-wide uncertainty, market makers can become risk averse. This has always been true of liquidity providers and has not changed as a result of the advent of electronic or high frequency trading. The Brady Commission Report on the 1987 crash found that market makers formally withdrew from the markets, stopped answering their telephones, and were only willing to fulfill their minimum obligations at the quote.<sup>24</sup> Recognizing that this is an important dynamic present in today’s US equity market, reforms should focus on ensuring appropriate mechanisms are in place to encourage market maker participation during periods of significant volatility.

### EXHIBIT 5: LIQUIDITY PROVIDERS AND THEIR OBLIGATIONS

Liquidity Provider	Description	Obligations
<b>Broker-dealers</b>	Broker-dealers facilitating block orders for customers.	<ul style="list-style-type: none"> <li>No obligations.</li> </ul>
<b>Exchange-registered market makers</b>	Exchange liquidity provider as defined by the rules and liquidity programs established by each exchange.	<ul style="list-style-type: none"> <li>Must be registered on the exchange, maintain adequate capital requirements, and provide continuous two sided quotations.</li> <li>Market makers may have exchange obligations to quote at minimum spreads or sizes for specified proportions of the trading day.</li> <li>Market makers may be required to stand in and facilitate auctions.</li> <li>Compensated by better tiers for fees/rebates, direct payments for providing liquidity, or priority on orders.</li> </ul>
<b>Wholesale / OTC market makers</b>	Market maker that specifically makes markets to smaller regional or retail brokers.	<ul style="list-style-type: none"> <li>Must guarantee client execution but can fulfill this obligation by routing flow out to an exchange instead of committing capital.</li> <li>Generally need to demonstrate and compete on price improvement metrics and execution quality statistics.</li> </ul>
<b>Electronic market makers</b>	Automated high frequency market makers that seek to capture the bid/offer spread and exchange rebates as a risk premium for providing liquidity.	<ul style="list-style-type: none"> <li>No obligations.</li> </ul>
<b>High Frequency Arbitrageurs</b>	Proprietary trading firms which employ high frequency trading strategies to conduct statistical or index arbitrage to capture mispricing between correlated or related assets.	<ul style="list-style-type: none"> <li>No obligations.</li> </ul>

## Recommendations to Address Extraordinary Market Volatility

In light of the market's response to recent market volatility, further adjustments to the existing framework are necessary. Enhancements that increase transparency and clarity of value in times of stress will improve the ability of market participants to function properly. BlackRock recommends that policy makers and market participants consider several components of market structure:

1. Harmonize trading rules among futures, options, individual stocks, and ETPs.
2. Recalibrate Limit Up-Limit Down rules.
3. Consider revising the market-wide circuit breakers.
4. Ensure transparency and timeliness of the primary market open.
5. Eliminate uncertainty in the determination of "clearly erroneous" trades.
6. Issuers (of both stocks and ETPs) should be proactive in considering an exchange's auction processes and trading rules before listing their securities.
7. Educate investors on how to navigate the modern US equity market.

### Harmonize Trading Rules Among Futures, Options, Individual Stocks, and ETPs

While references to the "equity market" often conjure up notions of individual stocks, in today's markets, futures, options, and ETPs play a critical role in facilitating price discovery and promoting the overall functioning of the equity market ecosystem. In general, we believe that policy makers should take a holistic approach to market structure in order to affect meaningful change, as policies that address only one segment tend to shift risks to other parts of the ecosystem as opposed to mitigating those risks. We recommend that policy responses to the events on August 24 consider all components of the equity market ecosystem, including stocks, futures, options, and ETPs.

In thinking about August 24 and potential recommendations, we considered whether or not ETPs should be halted from trading when a significant number of underlying stocks are halted. We concluded, however, that this was not the most effective approach given that ETPs can provide valuable price discovery for their underlying stocks during dislocations. For example, ETPs traded before most underlying stocks were opened on September 17, 2001 (the first day of trading after the September 11 attacks) and proved to be accurate predictors of major benchmark levels once all stocks were opened.<sup>25</sup> Similarly, ETPs based on international stock or fixed income benchmarks regularly trade without concurrent price information from underlying markets (e.g., Japanese

*"Enhancements that increase transparency and clarity of value in times of stress will improve the ability of market participants to function properly."*

equities during NY trading hours). Further, many ETPs based on US large capitalization stock benchmarks traded continuously and in line with underlying stock values throughout the morning of August 24. As a result, we concluded that preventing ETPs from trading when a significant number of the underlying securities are halted is not a desirable response and could have unintended negative consequences for market liquidity. Although it is tempting to single out ETPs, we believe it is essential to address the underlying equity market structure issues to improve the investor experience in both individual stocks and ETPs.

As discussed in more detail below, we keep coming back to the importance of information transparency and aligning market trading rules to reduce uncertainty and unnecessary complexity. We recognize that these issues span regulators and exchanges and strongly encourage a coordinated response to avoid unintended consequences or regulatory arbitrage from inconsistent rules.<sup>26</sup>

### Limit Up-Limit Down Procedures

The LULD mechanism is a sensible safeguard introduced to protect investors from sudden unanticipated price movements in individual stocks. Under the LULD plan, price bands (i.e., thresholds) are established for each security according to its price, its average trading volume, and the time of day. If the quotes for a stock are outside of its specified price bands the security enters into a 15 second "limit state". The limit state is a grace period during which the market can quickly reverse an anomalous price move; trading is still permitted within the price bands and the security can intrinsically exit the limit state if the quotes revert. A LULD trading pause, which suspends all trading for 5 minutes for individual stocks and ETPs, is only declared if the stock does not exit the limit state within 15 seconds. When the stock has been halted, investors must wait until the primary exchange re-opens the security before trading can resume. The LULD halt is designed to allow market participants to react to material supply and demand imbalances before resuming trading.

LULD is a helpful protection when idiosyncratic events impact one or a handful of securities. However, August 24, with nearly 1,300 LULD events, demonstrated that LULD rules are less effective for market-wide events where multiple securities trigger LULD halts at the same time. Notably, August 24 was the first large-scale assessment of the LULD plan since its implementation after the 2010 Flash Crash. To put this in

perspective, there were only 8,515 LULD events since the inception of LULD in 2013 and the end of 2014.<sup>27</sup> Overall, the trading halts seem to have worked as designed to stem the sharp sell-off. However, upon further consideration, we believe that other solutions, such as the market-wide circuit breakers discussed in the following section would be more effective in addressing market-wide events. That said, to improve the overall effectiveness of LULD rules as a protection for individual securities, we believe that there is a need to improve the consistency of LULD rules throughout the trading day and across the entire equity market ecosystem.

In particular, under the current LULD rules, the price bands which trigger a LULD event are currently doubled during the first 15 minutes and last 25 minutes of the trading day.<sup>28</sup> We believe that this doubling is inconsistent with the objective to address severe price volatility, as the open is precisely the time of day when volatility is greatest and firmer controls are needed (see Exhibit 12). Additionally, wider bands across different windows of time create asymmetry in the market's ability to recover after prices have moved too far too fast. For example, suppose a stock triggers a 10% limit down trading pause at 9:42am (e.g., it falls from \$100 to \$90). In order to fully correct, the stock must endure two 5% limit up halts because any reversal will develop after 9:45am, when the price bands are no longer doubled. This observation is supported by the LULD evidence from August 24 when there were 773 Limit Up halts, outnumbering 505 Limit Down halts.<sup>29</sup> The skew in the price bands arbitrarily constrains the security and introduces delays to the market's ability to self-correct extraordinary price dislocations that arise within the first 15 minutes and last 25 minutes of the trading day. BlackRock recommends that the LULD price bands should not be doubled around the open or close, and instead one appropriately calibrated threshold should be used for the full duration of the trading session.

Further, we note the inconsistency between the 5 minute trading pause required by the LULD plan for equity securities such as individual stocks and ETPs and the 2 minute trading halts for CME futures. This disparity highlights the importance of a coordinated response and a need to harmonize rules for futures and equities. For many securities on August 24, the length of the LULD halts appear to have prolonged the persistence of price dislocations by preventing securities from reverting back more rapidly to their correct prices. Another idea that should be considered is establishing a longer timeframe for the limit state instead of fully suspending trading in a security, to provide a natural mechanism for the market to recover from anomalous price moves without resorting to a trading halt. A LULD trading pause is inherently disruptive as it interferes with the natural interaction of orders and precludes any possibility of a recovery until trading resumes. In contrast, the LULD limit state provides market participants with greater flexibility by providing a grace period during which a correction or reversal

can take place while still preventing any executions from occurring outside of the price bands. BlackRock believes that recalibrating the LULD halt by extending the limit state and reducing the trading pause, particularly to account for periods where multiple securities are in LULD, would allow securities to more efficiently find equilibrium trading levels. Policy makers and market participants should jointly identify the optimal combination of trading pause and limit state durations based on an assessment of how much time is required for liquidity to form again. There is also a need to consider updating market-wide circuit breaker rules to address the limitations of LULD rules during periods of market-wide volatility. Given the continuing evolution of equity markets, we recommend that these rules be reassessed periodically.<sup>30</sup>

Given the experience of August 24, we also considered the merits of introducing LULD bands specific to US equity ETPs. Such bands, could come in several forms. Based on our analysis, however, we have not made recommendations in favor of introducing ETP-specific reforms. Our view is that investors will be better served by market participants and regulators remedying the root causes of August 24, as opposed to trying to curb expressions of those underlying problems. We are also wary after August 24 of the unintended consequences of introducing further complexity by differentiating among different types of equity securities. Below, we describe three ETP-specific reforms that we considered but do not recommend.

1. **Different, perhaps narrower, LULD bands for US equity ETPs than stocks.** We are concerned that implementing different LULD bands for ETPs could potentially introduce operational complexity and confusion. Differentiated bands would have to account for the wide diversity of ETPs in the US market, ranging from US equity-based (broad market or narrowly tailored), to others based on fixed income, foreign equities, or commodities. A rule of this nature would introduce complexity by necessitating differential treatment across ETPs and versus other kinds of equity securities. Instead, we believe alignment of rules across the equity market ecosystem would be a more effective solution than proposing different bands for ETPs.
2. **LULD bands for ETPs based on premium/discount to the most recent NAV.** As with the preceding point, we are concerned that different LULD bands for ETPs could potentially introduce operational complexity and confusion. A separate issue is that basing LULD bands on the most recent NAV – typically calculated as of the prior day's close – would inhibit price discovery when there is significant overnight news, as was the case on August 24. Such a band would be calculated off of a "stale" NAV, creating an increase in unproductive trading halts for ETPs. A band like this would structurally impair a key purpose for which investors use ETPs, namely efficient, rapid price discovery for broad-based market movement.

3. **LULD bands for ETPs based on premium/discount to the most recent indicative intradate valuations (IIVs).**

Basing LULD bands on IIVs might have some appeal if IIVs were guaranteed to be reliable. However, data errors beyond the control of the ETP (e.g., calculation errors by an IIV data vendor) could trigger unnecessary halts for ETPs. Further, LULD halts based on IIVs might not be understood widely and could cause significant confusion among investors. We believe it is better to fix the underlying impediments to price and order information flow, and enable market makers to execute the arbitrage mechanism effectively.

**Market-Wide Circuit Breakers**

The market-wide circuit breakers (MWCBS) are measures designed to protect investors from severe market declines by establishing coordinated trading halts across equities, options and futures exchanges. These controls were adopted after the 1987 crash and have been amended over time. MWCBS procedures are currently implemented in three stages according to severity of the price move observed in the S&P 500 index. A “Level 1” halt lasting 15 minutes is triggered after a 7% decline, a “Level 2” halt lasting 15 minutes is initiated after a 13% drop, and trading is suspended for the remainder of the day for a “Level 3” halt after a 20% decline.

Since the 2010 Flash Crash, there has not been a single instance when the S&P 500 index has exceeded the 7% MWCBS Level 1 threshold. In fact, as shown in Exhibit 6, the MWCBS threshold would only have been triggered a dozen times since 1980. Trading halts interrupt the natural price discovery process that occurs through trading, which can be harmful to liquidity provision. Additionally, frequent MWCBS halts may undermine investor confidence as they suspend trading in all securities – even those which have not experienced any problems. That said, a market-wide halt should be triggered when normal market mechanisms are not working, otherwise trading at anomalous prices can destabilize the market. On August 24, market mechanisms were not working properly. Securities experienced sharp price dislocations and nearly 1,300 LULD halts were triggered as the market lacked transparency and clarity, demonstrating a limitation of the LULD mechanism during market-wide events. A MWCBS halt may have helped to stabilize the market and curtail the steep price declines, and might have avoided executions at unexpected levels. In addition, a market-wide halt may have mitigated the excessive number of LULD trading pauses in individual securities. BlackRock believes that policy makers should reassess the MWCBS to determine whether lower thresholds that would be tripped more frequently than the current thresholds (such as thresholds that would be tripped annually) would provide better protection for investors. MWCBS thresholds need to strike the right balance between protecting the markets against severe volatility and minimizing the discontinuity caused by halting the entire market.

**Exhibit 6: NUMBER OF DAYS WHEN S&P 500 DECLINES EXCEEDED SPECIFIED THRESHOLDS**

S&P 500 Decline	Since 1960	Since 1980	Since 2000	Since 2010
<-3%	160	155	112	19
<-5%	35	34	23	4
<-7%	12	12	10	1
<-10%	1	1	0	0

Source: BlackRock, Bloomberg. As of August 31, 2015. Each period begins on Jan. 1 of the year.

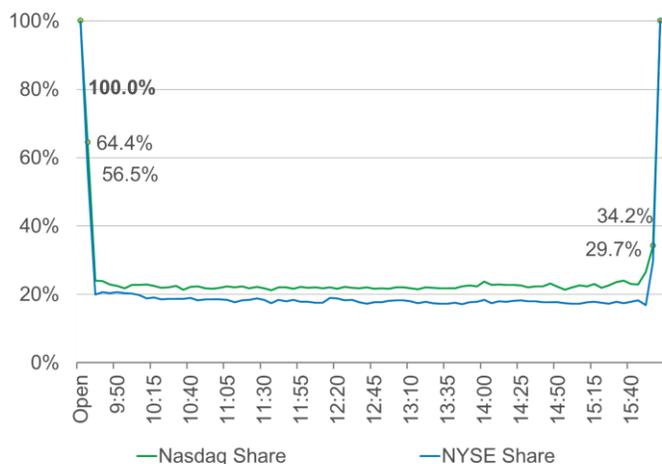
Additionally, BlackRock believes policy makers should consider establishing a MWCBS that is based on the number of individual securities halted or disrupted. Since the current MWCBS thresholds depend on the price of the S&P 500 index, the MWCBS is susceptible to disruptions in the index calculation. If a substantial number of the underlying stocks in the S&P 500 are halted or subject to delayed opens, the index level may be using stale prices. This situation may inadvertently reduce the likelihood that a MWCBS will be triggered in stressed markets since the S&P 500 index would not reflect real-time market conditions. In fact, due to delays in the opening auctions for equities on August 24, 25% of S&P 500 stocks (constituting 15% of market weight) had not opened by 9:40am.<sup>31</sup> If primary market open prices on the constituent stocks were used to calculate the index level, the S&P 500 would likely have opened down 6.5%.<sup>32</sup> The contrast between this result and the -5.3% low observed in the index in the first five minutes of trading highlights that disruption in a high proportion of individual securities may compromise the performance of the MWCBS. Further analysis by policy makers will be required to determine what percentage of securities would be an appropriate MWCBS trigger.

**Primary Market Opens**

In today’s fragmented market, the open and close are times of day when the listing exchange maintains primacy in the share of volumes traded. As Exhibit 7 demonstrates, this dynamic persists even in the minutes following the open and leading up to the close. During these timeframes, information about order book imbalances and clearing prices on the primary exchange is critical for investors to accurately gauge overall market sentiment and direction. Professional traders will naturally moderate their trading activity until this data becomes available. As a result, market transparency is severely impaired when the primary open is delayed, imbalance indications are unavailable, or clearing prices do not accurately reflect market interest.

BlackRock believes that accurate pre-open indications should be disseminated to market participants regarding order imbalances and expected open prices. However, we recommend that regulators and exchange officials address

### Exhibit 7: PRIMARY EXCHANGE SHARE OF TOTAL MARKET VOLUME IN NASDAQ 100 AND NYSE 100



Source: Deutsche Bank. Data shows average for Q2 2015.

shortcomings in the NYSE Order Imbalances data feed, rather than focusing on the much publicized NYSE Rule 48. Rule 48 has received abundant criticism for hindering transparency because it suspends the mandatory dissemination of tape indications regarding the opening price range. While Rule 48 does curb these indications, its primary aim is to eliminate time consuming *manual* procedures from the opening of NYSE equities when DMMs would be overwhelmed by the volume of stocks in conditions of extreme volatility. The indications suspended by Rule 48 have mandatory minimum display times which must be observed before the stock can be opened and would likely have introduced more delays.<sup>33</sup>

In contrast, the NYSE Order Imbalances data feed publishes automated real-time auction imbalances and is unaffected by Rule 48. This feed would have operated effectively on August 24 to disseminate pre-open imbalance information to market participants but for one key shortcoming – it stops publishing at 9:35am. For stocks that opened prior to 9:35am, this would have provided sufficient transparency about pre-open positioning; however, for the large number of stocks that experienced delayed market opens, there was a sizeable information gap. We recommend extending the publication of this feed until each stock actually opens to ensure the steady flow of timely and accurate information.

BlackRock believes that primary market procedures should be reviewed to identify opportunities to improve the timeliness of the open. Delays in the market open during periods of extraordinary volatility are particularly harmful as they contribute to market uncertainty and alarm investors. Most liquidity providers do not have an obligation to make markets – therefore they will only do so when they assess that they can perform their normal market activities effectively. Their

appetite to provide liquidity on related instruments or products that track equities, such as ETPs, is adversely affected by inordinate disruption of price discovery at the open. Exhibit 8 highlights that some exchanges like BATS and NASDAQ were able to promptly open trading in an automated fashion on August 24. NYSE-listed equities, however, were subjected to excessive delays. This backlog is perplexing since the invocation of Rule 48 should have given NYSE DMMs the flexibility to expeditiously open stocks. Under normal circumstances, when only a handful of stocks may be subject to news or events such as initial public offerings (IPOs), NYSE’s hybrid model, which combines human oversight and technology, works well to limit volatility and ensure an orderly open. However, on August 24 it may have inadvertently contributed to delayed opens and heightened market uncertainty. Manual procedures for broad-based events are inefficient and can contribute to debilitating delays when DMMs are not staffed to handle the volume. We recommend that regulators examine whether opening procedures should be further automated in order to promote fair and effective markets during conditions of market-wide volatility.

### Exhibit 8: NUMBER OF SECURITIES OPENED BY EXCHANGE AND TIME ON AUGUST 24

Open Time	NYSE MKT	NYSE Arca	NYSE	NASDAQ	BATS
9:30-9:35	204	1,239	1,086	2,751	20
9:35-9:40	60	10	559	2	0
9:40-9:50	33	14	833	1	0
9:50-10:00	1	11	371	0	0
10:00-10:30	0	38	191	2	0
> 10:30	0	89	0	3	0

Source: BlackRock, TAQ Data

The impact of price collars on auctions is another area of concern. Collars are useful controls which can prevent errant price fluctuations. When collars are too restrictive, however, they inhibit price discovery and result in clearing prices which are not representative of the overall buying and selling demand in the market. Additionally, since any eligible, residual demand is immediately transmitted into the order book, tight collars can cause excessive volatility after the auction when significant order imbalances exist. On August 24, the unprecedented number of LULD halts during the first minute of trading in NYSE Arca listed securities suggest that the auction collars interfered with price formation and contributed to the disruptive volatility. NYSE Arca has since revised its collars for the opening auction to levels which are less restrictive and better aligned with erroneous trade guidelines.<sup>34</sup> We commend NYSE Arca for

acting quickly and believe that this change will help to alleviate imbalances and promote more orderly trading of securities. However, we also note that a significant number of LULD events were triggered less than a minute after the resumption of trading following a LULD pause on NYSE Arca. This phenomenon indicates that the trading halt auction that NYSE Arca uses to re-open trading may be adversely impacted by price collars. BlackRock recommends that NYSE Arca widen the collars for other auctions to clear any residual imbalances and ensure that the auction price is more reflective of the supply and demand in the security. Auctions which do not fully exhaust marketable buying or selling interest leave the order book in a state of imbalance which is vulnerable to severe price dislocations. NYSE Arca is not unique in its use of collars; the auction processes for BATS and NASDAQ are similarly subject to price collars. As such, we recommend that exchanges assess the impact of price collars on an ongoing basis to ensure that they do not disproportionately constrain auctions or amplify volatility following an auction.

### Erroneous Trade Guidelines

The erroneous trade policies instituted by the exchanges have helped to mitigate anxiety over the arbitrary nature of trade cancellations in the wake of the 2010 Flash Crash. This has increased transparency for investors and helped participants to assess the risks and opportunities around sizeable price moves. However, these rules were enacted at a different time than the LULD plan. As a result, the thresholds for LULD and the erroneous trade policies are not in alignment. Exhibits 9 and 10 highlight that there are many situations under the current guidelines in which transactions fall within the price bands of the LULD circuit breakers, yet may potentially be considered erroneous. For example, a \$15 Tier 2 NMS stock at the open would have a 20% LULD trigger, but trades which are 10% away from the consolidated last sale could undergo review as erroneous transactions. As we have previously noted, market makers are not incentivized to supply liquidity in volatile markets, especially

when faced with the risk that their positions may become unhedged.<sup>35</sup> The discrepancy between LULD price bands and erroneous trade guidelines undermines liquidity provision when it is most needed.

Furthermore, the erroneous trade dispute process may be difficult for all market participants to access equitably. The request to have an exchange review a trade must usually be made within 30-60 minutes of the execution. This window is necessarily narrow in order to achieve quick and orderly resolution of trade appeals. However, it may naturally disadvantage investors who are not active traders. Although only a few trades were cancelled on August 24 according to Deutsche Bank's report on the events of August 24,<sup>36</sup> it is very likely that the opportunity to review a transaction had long since expired before many market participants were even aware that they had executions. In some instances, investors may not realize that their orders have been filled until they receive the trade confirmation reports. As such, policies which prevent anomalous trades from ever occurring are more effective than cancellation guidelines that leave market participants liable for bad executions. In fact, in proposing the LULD plan, the plan participants stated that a "key benefit of the limit up-limit down requirements should be the prevention of clearly erroneous executions".<sup>37</sup> BlackRock recommends a review to harmonize erroneous trade guidelines and LULD rules to eliminate any uncertainty regarding whether a trade will be cancelled.

### Issuer Consideration of Listing Standards

Events from August 24 have demonstrated that exchange rules and procedures have an enduring effect on the market quality of their listed securities. Exchange practices may inhibit transparency of imbalances, set auction prices that are not fully representative of overall demand, or aggravate price volatility. As such, BlackRock believes that issuers of both individual stocks and ETPs have a responsibility to their investors to consider whether an exchange's rules and processes are sound before listing their securities. ETP

**Exhibit 9: LULD PRICE BANDS**

Category	Reference Price	9:45 am-3:35 pm	9:30 am-9:45 am 3:35 pm-4:00 pm
Tier 1 NMS Stocks*	> \$3	5%	10%
Tier 2 NMS Stocks**	> \$3	10%	20%
All NMS Stocks	Between \$0.75 and \$3	20%	40%
All NMS Stocks	< \$0.75	\$0.15 or 75%	\$0.30 or 150%

Source: BlackRock, FINRA.

\*Tier 1 NMS Stock = All NMS stocks included in the S&P 500 Index, the Russell 1000 Index, and selected ETPs (as noted in the LULD plan).

\*\*Tier 2 NMS stock = All NMS stocks other than those in Tier 1.

**Exhibit 10: ERRONEOUS TRADE GUIDELINES**

Reference Price	Regular Trading Hours
Between \$0 and \$25	10%
Between \$25 and \$50	5%
Greater than \$50	3%
Multi-stock Event (between 5 and 20)	10%
Multi-stock Event (20 or more)	30%
Leveraged ETF/ETN	Guidelines multiplied by leverage multiplier (e.g. 2x)

Source: BlackRock, NYSE.

## Exhibit 11: DESCRIPTION OF DIFFERENT ORDER TYPES

Order Type	Description	Price Discretion	Immediacy
Market	Order to buy or sell securities immediately at the best available price	None	Immediate
Limit	Order to buy or sell securities at a specified price or better	Within Limit	Execution not guaranteed
Stop	Order which converts into a market order when the stop price is reached	None	Immediate after activation
Stop Limit	Order which converts into a limit order when the stop price is reached	Within Limit	Execution not guaranteed after activation

Source: BlackRock.

sponsors and public companies can shape better outcomes by engaging with exchanges to prioritize market structure improvements, discourage disruptive activity, and promote fair and orderly markets in their securities. Listing standards should include effective market maker incentives, prudent trading rules, and robust mechanisms for managing extraordinary volatility.

### Investor Education

US equity market structure has evolved markedly over the years. The modernization of the equity market has principally benefited investors by increasing efficiency and reducing costs, but it has also resulted in greater complexity and fragmentation. It is important for market participants to adapt to this altered landscape. More than ever, investors must protect themselves by updating their understanding of how to navigate the current market environment. This includes determining the most appropriate order type to use when considering a transaction and identifying how different liquidity climates may impact execution quality. Exhibit 11 summarizes some common order types that are available to investors.

In today's market, it is important to have an understanding of how order types can be used to achieve execution prices that are in line with the investor's expectations. Market and stop orders (often referred to as stop-loss orders) prioritize immediacy of execution over price discretion and may be filled at prices significantly higher or lower than the current bid/offer. Said another way, market and stop orders seek quick execution as their primary objective without regard to the price of execution. This exposes investors to greater risk of poor executions during periods of low liquidity or high volatility. While these orders may result in execution near the current price during normal market circumstances, in stressed markets, such orders may distort price discovery and further exacerbate volatility by seeking executions at any price. Additionally, stop orders do not constitute a guaranteed fill at the stop price. Stop orders are automatically converted into market orders when the stop price is reached. Since the price movement which triggers a stop may often be a sharp price gap driven by impactful news or changes in market climate, these orders can be executed at levels which are dramatically different than the stop price.

Only limit and stop limit orders, which ensure that executions are at or better than a specified price, protect investors against very low sale or very high purchase prices.<sup>38</sup> Investors should consider using limit orders which are marketable to increase the likelihood of an execution while still retaining protection against large price moves. Marketable limit orders are limit orders that are currently executable at the existing market price, as the limit price is set at or above (below) the best offer (bid) price for a buy (sell) order.

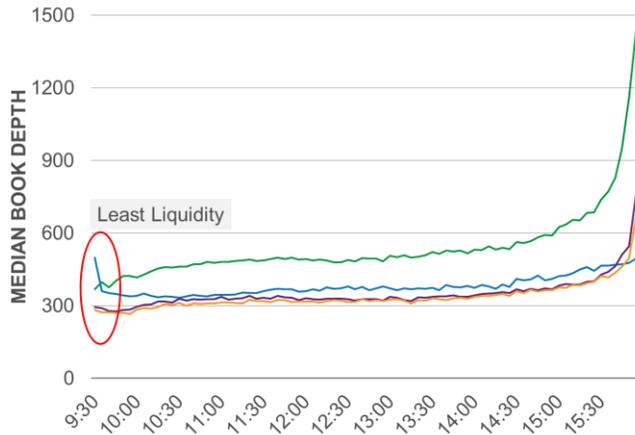
Another area where further education is required, is the fact that trading around the open can be particularly volatile – this is a period when investors digest new information and price discovery is taking place in the market. During this time, liquidity providers will typically widen their bid-offer spreads or reduce the depth of their interest to manage risk. Exhibit 12 highlights some of the intraday dynamics which exist in the US equity market. The first 30 minutes of the day typically has:

- ▶ *The least liquidity* – order book depth, or the quantity of shares available for execution at the best bid or offer, is weakest in the morning when uncertainty is high and conviction is low;
- ▶ *The greatest volatility* – the risk of substantial price fluctuations is higher when investors are reacting to news and shifts in order imbalances;
- ▶ *The highest trading costs* – transaction costs are directly related to the bid-offer spread which is wider when uncertainty and volatility are high. Market and stop loss orders, in particular, will sell at the bid and buy at the offer, thereby paying the full bid-offer spread in costs.

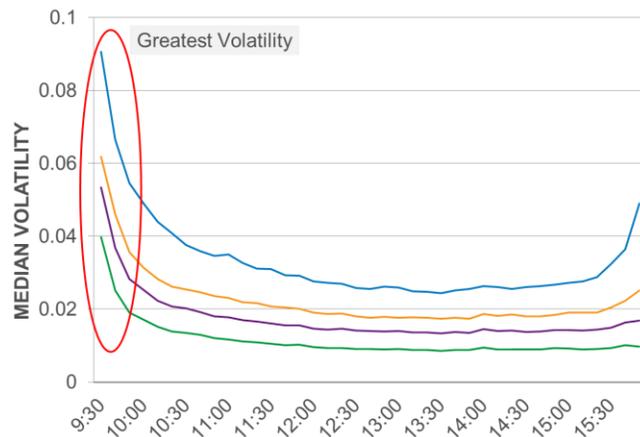
At the open, market participants must carefully consider which order types will achieve the best outcomes and are the most appropriate for their investment objectives. Orders that seek liquidity at any price may expose investors to prices which reflect the cost of liquidity at a given point in time as opposed to the underlying fundamental value of a security. Taken together, we believe that it is important that investors are educated about how to navigate today's complex equity market and volatility. In particular, investors should have an understanding of the implications and potential risks associated with the use of "liquidity at any price" order types,

## Exhibit 12: INTRADAY DYNAMICS IN THE US EQUITY MARKET

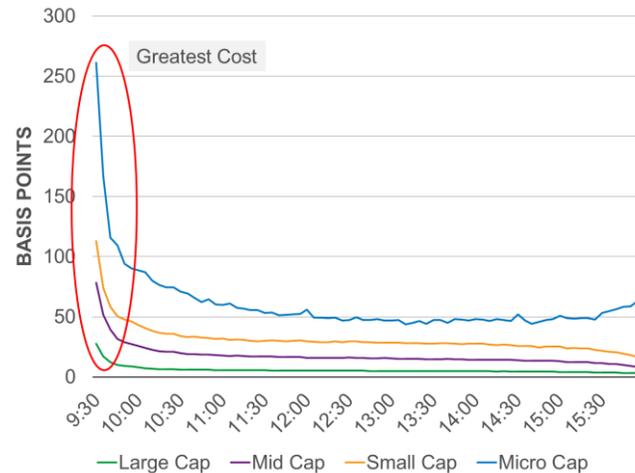
### Intraday Book Depth



### Intraday Volatility



### Intraday Bid-Ask Spread



Source: KCG

such as market and stop-loss orders. We are supportive of ongoing cost/benefit analyses to determine whether certain constraints on market and stop-loss orders would be appropriate. Further discussion is needed to determine whether other protections should be implemented; for example, additional disclosure to customers regarding the potential risks associated with the use of market and stop-loss orders. Customer-facing broker-dealers are best positioned to consider ongoing investor education efforts.

## Conclusion

As market participants and regulators continue to review the events of August 24, many have asked: what can we learn from August 24 and how can we collectively move forward in light of this experience? Over the past few weeks, we have considered various lessons from August 24 and we have identified three key issues:

1. A confluence of underlying US equity market issues exposed structural flaws that impeded the flow of order and pricing information, halted trading, and delayed the open for various securities.
2. The US equity ETP arbitrage mechanism was temporarily impaired due to disruptions stemming from the above issues.
3. Excessive use of market and stop-loss orders that seek “liquidity at any price”, inflamed the situation.

As described in this *ViewPoint*, we believe that a holistic approach to enhancing equity market structure is necessary to help the market better cope with periods of excessive volatility and order imbalance. Within this context, it is important to acknowledge that liquidity provision is primarily supplied by market participants who have no obligations to make markets. As such, there is a need to revisit and enhance well-intentioned and important market protection mechanisms such as the market-wide circuit breaker and LULD as well as exchange opening procedures. August 24 reminded us that ETPs whose underlying securities are US equities are dependent on a functioning “arbitrage mechanism”. US equity market structure reforms should be implemented to address the temporary breakdown in market makers’ ability to participate in the “arbitrage mechanism” on August 24. Last, customer education is needed to ensure appropriate and informed use of market and stop-loss orders. A joint effort among US equity market participants, including regulators, exchanges, proprietary trading firms, equity investors, and ETP sponsors would be an excellent first step. While there is no “silver bullet” that can address the issues brought to light on August 24, a collective effort that includes the perspectives of all market participants to help identify actions will improve the US equity market’s resiliency.

## Notes

1. For additional information on the May 2010 Flash Crash, see BlackRock, *ViewPoint*, Revisiting the Flash Crash: A Year Has Passed, What has Changed? (May 2011), available at <http://www.blackrock.com/corporate/en-us/literature/whitepaper/viewpoint-revisiting-the-flash-crash-may-2011.pdf> and BlackRock, *ViewPoint*, Understanding the “Flash Crash”: What Happened, Why ETFs Were Affected, and How to Reduce the Risk of Another, (Nov. 2010), available at <https://www.blackrock.com/corporate/en-ch/literature/whitepaper/understanding-the-flash-crash-nov-2010.pdf> (November 2010 Flash Crash *ViewPoint*).
2. Bloomberg. As of Aug. 24, 2015.
3. Id.
4. TAQ. As of Aug. 24, 2015.
5. Id.
6. JP Morgan, NYSE. As of Aug. 24, 2015.
7. Credit Suisse, Market Commentary, “Perfect Storm Leads to ETF Trading Halts” (Sep. 30, 2015), available at <https://edge.credit-suisse.com/edge/Public/Bulletin/Servefile.aspx?FileID=26992&m=-1862231407>.
8. Goldman Sachs Research, “How ETFs Shaped Yesterday’s Selloff” (Aug. 25, 2015) (Goldman Sachs ETF Report).
9. Bloomberg. As of Aug. 24, 2015. Note that at 9:35am on August 24, the S&P 500 index was down 5.3% from previous close.
10. Id.
11. In the event that an extreme market volatility condition is declared with respect to trading on or through the facilities of the NYSE, the NYSE can temporarily suspend applicable requirements to make pre-opening indications in a security (Rules 15 and 123D(1)) at the opening of trading or reopening of trading following a market-wide trading halt. See NYSE, Rule 48: Exemptive Relief – Extreme Market Volatility Condition, available at [http://nyserules.nyse.com/NYSETools/PlatformViewer.asp?selectednode=chp\\_1\\_3\\_7\\_14&manual=nyse/rules/nyse-rules/](http://nyserules.nyse.com/NYSETools/PlatformViewer.asp?selectednode=chp_1_3_7_14&manual=nyse/rules/nyse-rules/).
12. TAQ. As of Aug. 24, 2015.
13. KCG, Market Insights, Examination of August 24 Market Volatility (Sep. 14, 2015).
14. NYSE. As of August 24, 2015.
15. JP Morgan, NYSE. As of Aug. 24, 2015.
16. Nasdaq, Press Release, New York Stock Exchange Remains Global Leader in Capital Raising in First Half of 2015; Leader in Tech IPOs, REITs and ETP Listings (Jul. 6, 2015), available at <http://www.nasdaq.com/press-release/new-york-stock-exchange-remains-global-leader-in-capital-raising-in-first-half-of-2015-leader-in-20150706-00315#ixzz3n5V8UCJE>.
17. NYSE Arca, Trader Update, NYSE Arca Equities Enhancements to Auction Collars (Sep. 4, 2015), available at [https://www.nyse.com/publicdocs/nyse/markets/nyse-arca/NYSE\\_Arca\\_Trader\\_Update\\_Auction\\_Collars\\_Sept\\_2015.pdf](https://www.nyse.com/publicdocs/nyse/markets/nyse-arca/NYSE_Arca_Trader_Update_Auction_Collars_Sept_2015.pdf) (NYSE Arca Trader Update).
18. APs are sophisticated institutional trading firms that enter into a contract with the ETP specifying rules for creating and redeeming ETP shares.
19. For many years, including most recently in our August 2015 letter to the SEC, we only included two categories – valuation clarity and access – that are necessary for an effective arbitrage mechanism. However, in light of the events of August 24, we felt it was important to acknowledge that certainty of execution, which was lacking for certain periods on that day, is also essential. See BlackRock, Comment Letter, Request for Comment on Exchange-Traded Products – SEC (Aug. 11, 2015), available at <https://www.blackrock.com/corporate/en-in/literature/publication/sec-request-for-comment-exchange-traded-products-081115.pdf>.
20. Harts, William R., Modern Markets Initiative, Letter to SEC (Sep. 24, 2015), available at <http://modernmarketsinitiative.org/wp-content/uploads/2015/09/Letter-to-SEC-on-ETFs.pdf>.
21. ArcaVision. As of August 24, 2015.
22. Goldman Sachs ETF Report.
23. NYSE Arca Rules, Rule 104.
24. The Brady Commission Report found that: “When abnormal demands confront the equity market, the liquidity in each marketplace is unimportant...[market makers go home with relatively small positions]...Investors must depend on the liquidity supplied by participants in the entire equity market.” See Report of the Presidential Task Force on Market Mechanisms (Jan. 1988) at 57.
25. State Street Global Advisors, “Stress Testing ETFs: Lessons from the Last Twenty Years” (Jan. 2014), available at <http://spdr-etfs.com/data/uploads/2014/01/Stress-Testing-ETFs-Lessons-from-the-Last-Twenty-Years.pdf>.
26. Various elements of the US equity markets are regulated by the SEC and CFTC. While FINRA, NFA, and exchanges are self-regulatory organizations (SROs), the SEC and CFTC have ultimate oversight powers on securities matters under their jurisdiction.
27. Angel, James J., Ph.D., CFA, “Limit Up – Limit Down: National Market System Plan Assessment to Address Extraordinary Market Volatility”, (May 28, 2015), Georgetown University at 17.
28. Id. at 11. See also SEC, Release No. 34-64547, 76 Fed. Reg. 31647-31659 (Jun. 1, 2011), available at <http://www.gpo.gov/fdsys/pkg/FR-2011-06-01/pdf/2011-13472.pdf>.
29. TAQ. As of Aug. 24, 2015.
30. MFA suggests that a reassessment be conducted by regulators at least every two years. See Managed Funds Association, “U.S. Equity Market Structure: A Year in Review and the Push for Continued Vigilance,” (Sep. 2015), available at [www.tabbgroup.com](http://www.tabbgroup.com).
31. Bloomberg, TAQ. As of Aug. 24, 2015.
32. Id.
33. NYSE Rule 123D(1) requires that 3 minutes must elapse between the first indication and the market open and that an additional minute is required after each subsequent indication, in the event that the opening price will be outside of the prior indication. See [http://nyserules.nyse.com/nyse/rules/nyse-rules/chp\\_1\\_3/chp\\_1\\_3\\_8/chp\\_1\\_3\\_8\\_14/default.asp](http://nyserules.nyse.com/nyse/rules/nyse-rules/chp_1_3/chp_1_3_8/chp_1_3_8_14/default.asp).
34. NYSE Arca Trader Update.
35. November 2010 Flash Crash *ViewPoint*.
36. Deutsche Bank Global Market Structure, US Market Structure Commentary: Just Another Manic Monday? (Sep. 24, 2015).
37. NYSE Euronext, Response to Comments on Plan to Address Extraordinary Market Volatility Pursuant to Rule 608 of Regulation NMS under the Securities Exchange Act of 1934 (Nov. 2, 2011), available at <http://www.sec.gov/comments/4-631/4631-21.pdf>.
38. Although Limit and Stop Limit orders provide investors with price protection, they may result in delayed executions and do not guarantee a fill. Investors must assess whether the opportunity cost of not receiving an execution is outweighed by the increased certainty on the price achieved.

## RELATED CONTENT

- ▶ [ViewPoint - US Equity Market Structure: An Investor Perspective, Apr 2014](#)
- ▶ [Equity Market Structure Recommendations, Letter to SEC, Sep 2014](#)
- ▶ [ViewPoint - Revisiting the Flash Crash: A Year Has Passed, What Has Changed?, May 2011](#)
- ▶ [ViewPoint - Understanding the "Flash Crash": What Happened, Why ETFs Were Affected, and How to Reduce the Risk of Another, Nov 2010](#)

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