

# **Mechanisms Used By Trading Venues To Manage Extreme Volatility And Preserve Orderly Trading**

## **Final Report**



**IOSCO**

**The Board  
OF THE  
INTERNATIONAL ORGANIZATION OF SECURITIES COMMISSIONS**

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## Foreword

On March 7, 2018, the Board of the International Organization of Securities Commissions (IOSCO) published a Consultation Report, *Mechanisms Used by Trading Venues to Manage Extreme Volatility and Preserve Orderly Trading*, with a view to encouraging the public to comment on its analysis and recommendations (Consultation Report). Comments were requested by May 6, 2018.

Twelve comment letters were received and eleven considered by IOSCO as it prepared this Final Report, *Mechanisms Used by Trading Venues to Manage Extreme Volatility and Preserve Orderly Trading* (Final Report). The attached feedback statement in Annex B describes and addresses the major comments.

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## 1. Executive Summary

One of IOSCO's core objectives is to ensure that "markets are fair, efficient and transparent". Events of extreme volatility can undermine this objective, weaken the integrity of the securities markets and lessen investor confidence in the markets. The use of technology has grown exponentially in recent years. At the same time, there have been events of abnormal (including extreme) volatility in financial markets.

This Final Report (Report) explores the measures currently in use by trading venues<sup>1</sup> in member jurisdictions to address the risks to orderly markets resulting from extreme volatility events. In particular, this Report discusses:

- the various automated mechanisms used by trading venues to halt or constrain trading during extreme volatility events;
- the process for establishing and monitoring the thresholds and reference prices used in these mechanisms;
- how and what kind of information regarding the design, operation and triggering of these mechanisms is disseminated to regulatory authorities, market participants and the public; and
- the level of communication between trading venues both inside and outside the trading venue's home jurisdiction.

The Report identifies the use of price constraint mechanisms that reject or constrain certain orders rather than halt trading and allow trading and price formation to continue. In addition, the report identifies the importance of information sharing and communication between trading venues where securities or related asset classes are traded on multiple venues and the challenges where this occurs across jurisdictions.

The Report makes a number of recommendations to assist trading venues and regulatory authorities when making decisions about the implementation, operation and monitoring of volatility control mechanisms. Specifically, the report recommends that:

- trading venues should have volatility control mechanisms to manage extreme volatility and that these mechanisms should be appropriately calibrated and monitored;
- regulatory authorities should consider what information they require to effectively monitor the overall volatility control mechanism framework in their jurisdiction, and make sure that trading venues maintain relevant records;
- information about volatility control mechanisms and when they are triggered should be made available to regulatory authorities, market participants, and if appropriate, the public; and

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<sup>1</sup> For the purpose of this Report, the term "trading venue" is generally defined as exchanges or other multi-lateral trading facilities, including, for example, alternative trading systems (ATSS) and multi-lateral trading facilities (MTFs). We recognize, however, that the concept of a "trading venue" is evolving in a number of C2 member jurisdictions. For example, the concept may, at the discretion of individual members for their jurisdictions, also include swap execution facilities (SEFs) or the European "organized trading facilities" (OTFs). However, for this project a "trading venue" does not include a single dealer system or a broker crossing facility.

- appropriate communication amongst trading venues should be considered where the same or related securities are traded on multiple trading venues in a particular jurisdiction or in different jurisdictions.

## 2. Introduction

Recent events illustrate how extreme volatility can negatively impact securities markets and related asset classes across different jurisdictions. For example, the U.S. market volatility event on August 24, 2015 may have been associated with volatility in Asian markets; and the “flash crash” on May 6, 2010 impacted both the U.S. equity and futures markets<sup>2</sup> with “knock-on” effects on markets outside of the U.S., such as the Canadian equity market. Other volatility events include:

- October 15, 2014 – The U.S. Treasury market experienced significant volatility between 9:33 and 9:45 a.m. when the 10-year yield decreased 16 basis points and market depth declined 20% of its year-to-date average.<sup>3</sup>
- May 31, 2016 – Chinese equity futures rapidly declined over 12.5% and returned to previous levels seconds later.
- October 6, 2016 – The value of the British Pound dropped more than 6% recovering to prior levels soon after.
- February 16, 2017 – French government bond (OAT) futures experienced a volatility event with yields falling 11bps within 85 seconds, in a period of significant illiquidity, before recovering most of the drop within eight minutes.

Events such as the above have led many regulatory authorities to review and assess the consequences of extreme volatility events and to determine appropriate policy responses. In a number of jurisdictions, trading venues and regulatory authorities have or are considering implementing mechanisms to address extreme volatility and help maintain orderly markets.<sup>4</sup>

Volatility controls are often thought to provide a stabilising influence on the market in times of market distress, as a theoretical study by Greenwald and Stein (1991)<sup>5</sup> showed. However, empirical literature on the efficacy of market-wide circuit breakers has been limited owing perhaps to the fact that there has just been one market-wide circuit breaker trigger event in the U.S.<sup>6</sup> Goldstein and Kavajecz (2004)<sup>7</sup> studied the episode on October 27, 1997, and found that there was a decrease in liquidity in the following trading session. They attributed this decrease to limit order traders being reticent to resubmit expired orders from the previous trading session when the circuit breaker was invoked. Santoni and Liu (1993)<sup>8</sup> found that a market-wide trading halt failed to moderate volatility, after studying the impact of coordinated circuit breakers adopted by NYSE, CME and other derivatives exchanges. Fama

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<sup>2</sup> See <https://www.sec.gov/news/studies/2010/marketevents-report.pdf>

<sup>3</sup> See Joint Staff Report: The U.S. Treasury Market on October 15, 2014 (July 13, 2015), available at <https://www.sec.gov/files/treasury-market-volatility-10-14-2014-joint-report.pdf>

<sup>4</sup> In addition, other safeguards such as price checks conducted prior to order entry and trade reversal processes may be used to provide additional protection against excess volatility and help ensure fair and efficient price discovery.

<sup>5</sup> Greenwald, B.C., and Stein, J.C., (1991) Transactional Risk, Market Crashes, and The Role of Circuit Breakers, *J Business* 64, 443-462.

<sup>6</sup> “These halts were triggered for the first time on October 27, 1997 when the DJIA fell 350 points by 2:35 p.m. In the 25 minutes following the reopening at exactly 3:05 p.m., the Dow fell an additional 200 points to trigger a second halt, which closed the market for the day.”

<sup>7</sup> Goldstein, M., and Kavajecz, K., (2004) Trading strategies during circuit breakers and extreme market movements, *J Financial Markets* 7, 301-333.

<sup>8</sup> Santoni, G. J., and Tung Liu (1993) *Circuit breakers and stock market volatility*. *Journal of Futures Markets* 13(3), 261-277.

(1989)<sup>9</sup> found that circuit breakers delay price discovery and harm efficiency, noting that in cases where price moves are rational, then rational pricing does not imply lower volatility. Subrahmanyam (1994)<sup>10</sup> found that circuit breakers exacerbated price changes in subsequent periods and on other markets.

More recent studies, particularly post-“flash crash”, have reappraised the efficacy of these mechanisms, where on balance circuit breakers are perceived to benefit the markets. Kirilenko et al. (2017)<sup>11</sup> argued that circuit breakers would act as a calming influence on the market and build investor confidence, and noted that “appropriate safeguards must be implemented to keep pace with trading practices enabled by advances in technology”. Ackert, L., (2012)<sup>12</sup> contended that whilst market-wide circuit breakers interrupt the price discovery process, they provide the exchange and market participants time to reassess the market after a large volume shock, thereby putting a pause to a herd-type reaction to misinformation. She also notes the importance of coordinating across markets, to minimize risks to other markets. Furthermore, as many financial instruments can be traded at different trading venues, and with some orders being internalized or traded away from a trading venue, Ackert posits that regulations need to be simple and easy to implement so that market participants fully understand the implications. A study by Brugler and Linton (2014)<sup>13</sup> found that although trading suspensions may not improve the trading process within a particular financial instrument, they do play an important role preventing the spread of poor market quality across securities in falling markets and therefore can be effective tools for promoting market-wide stability.

In other markets, where similar mechanisms have been introduced, findings on the efficacy of these mechanisms have also been mixed. Lauterbach and Ben-Zion (1993)<sup>14</sup> researched instances of circuit breakers triggered on the Tel-Aviv Stock Exchange during the crash of 1987 when the market experienced extreme order imbalances resulting in the closure of the exchange. They found that while trading halts did not stop the overall decline in the market, they appeared to have lessened price volatility by minimizing order imbalances.

Previous IOSCO work, specifically the *Report on Trading Halts and Market Closures*<sup>15</sup> (2002 Report), examined interruptions<sup>16</sup> in securities trading, including how such

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<sup>9</sup> Fama, E. (1989). *Perspectives on October 1987, or, What Did We Learn from the Crash?* In R. J. Barro, & R. W. Kamphuis Jr., *Black Monday and the Future of Financial Markets* (pp. 71-82). Homewood, IL: Irwin.

<sup>10</sup> Subrahmanyam, A. (1994). *Circuit Breakers and Market Volatility: A Theoretical Perspective*. *J Finance*, 49(1), 237-254.

<sup>11</sup> Kirilenko, A., Samadi, M., Kyle, A., & Tuzun, T. (2017). *The Flash Crash: High-Frequency Trading in an Electronic Market*. *The Journal of Finance*.

<sup>12</sup> Ackert, L (2012) *The Impact of Circuit Breakers on Market Outcomes*, Foresight UK Government Office for Science, EIA9

<sup>13</sup> Brugler, J., and Linton, O. (2014) *Circuit breakers on the London Stock Exchange; Do They Improve Subsequent Market Quality?* Cambridge- INET Institute Working Paper Series No: 2014/04.

<sup>14</sup> Lauterbach, Beni, and Uri Ben-Zion (1993) *Stock market crashes and the performance of circuit breakers: Empirical evidence*. *J Finance* 48(5), 1909–1925.

<sup>15</sup> <https://www.iosco.org/library/pubdocs/pdf/IOSCOPD138.pdf> (Oct. 2002).

<sup>16</sup> In the 2002 Report, “trading interruptions” were described as referring to “trading halts” or “trading suspensions”. The 2002 Report further noted that a “trading halt generally is a temporary interruption in the trading of a financial instrument, group of securities or a securities derivative in anticipation of, or in reaction to, an unusual event or condition affecting a financial instrument or group of securities. Certain regulatory trading halts are sometimes



interruptions are authorized, how information is shared, as well as related issues involving multi-listed securities and derivative products and made a series of recommendations.<sup>17</sup>

In addition, in 2011, IOSCO published the report *Regulatory Issues Raised by the Impact of Technological Changes on Market Integrity and Efficiency*<sup>18</sup> (2011 Report), which addressed the broad technological changes impacting markets, including high frequency trading and measures used to address volatility, including trading halts, circuit breakers and price limits. In Recommendation 2 of the 2011 Report, IOSCO stated that “regulators should consider the extent to which trading venues should be required to have volatility control mechanisms (e.g., circuit breakers, limit-up-limit-down controls or volatility thresholds) for risk management and the prevention of market disruptions due to sudden volatile price movements.”<sup>19</sup>

Since the publication of the 2011 Report, the complexity and the interconnectedness of markets has continued to grow, brought about by further advances in computational and communication technology. The IOSCO Board has therefore mandated Committee 2 on the Regulation of Secondary Markets (C2) to review the measures used or being considered by trading venues and regulatory authorities to manage the impact of extreme volatility in member jurisdictions and/or preserve orderly trading, with the goal of building on the recommendations in the 2011 Report.

In preparing this Report, C2 surveyed regulatory authorities and trading venues in its member jurisdictions. This Report examines the current regulatory frameworks and the associated policy rationales. It also analyzes the mechanisms to manage extreme volatility that are in place or being considered, and the reasons for the approaches taken. However, this Report does not examine how changes in market structure or technology may have impacted volatility<sup>20</sup> nor does it identify and measure any causality for such volatility. This Report contains a series of recommendations applicable to the establishment, use and on-going monitoring of mechanisms that may be used to manage extreme, including abnormal, volatility, and/or preserve orderly trading.

Fixed income instruments are not considered in the scope of this Report. Given the prevalence of automated trading in many markets, this Report focuses primarily on “automatic” volatility interruptions and mechanisms to halt trading or reject orders such as:

- a) Volatility-based mechanisms that are triggered automatically with the intent of pausing or otherwise managing trading in a pre-defined manner such as when:

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referred to as trading suspensions, and are often broader in scope and of longer duration than a trading halt imposed by a market”.

<sup>17</sup> The recommendations included determining if a general continuation in trading of a given financial instrument should be permitted where trading has been halted in the initial listing market. More generally, participants should be aware of the basis on which halts might occur and communication mechanisms should be in place so that participants are aware of when halts take place. In addition, the report recommended that, when a primary market is closed because of an “extreme event” or an infrastructure failure, the reaction of other markets, including derivatives markets, should depend on their assessment of all the relevant facts.

<sup>18</sup> <http://www.iosco.org/library/pubdocs/pdf/IOSCOPD361.pdf>

<sup>19</sup> The recommendation goes on to state that “[t]rading systems and algorithms should be robust and flexible such that they are capable of dealing with, and adjusting to, evolving market conditions. In the case of trading systems, this should include the ability to adjust to changes (including sudden increases) in message traffic”.

<sup>20</sup> This Report does not look at non-automated mechanisms to halt or constrain trading, such as trading suspensions due to technical outages.

- trading is paused (or continuous trading is automatically changed to an auction) for a few seconds or minutes in single or specific securities to permit market participants to reconsider their orders/quotes<sup>21</sup> (single-stock circuit breakers); or
  - trading is halted for a certain time period in all or part of the securities in the market (market-wide circuit breakers); and
- b) Mechanisms to automatically reject or freeze certain orders without temporarily halting the market. These price constraint mechanisms may use order price or volume collars/bands, when continuous trading is maintained but any new bids and offers outside pre-determined thresholds are rejected.

In 2016, the World Federation of Exchanges (WFE) undertook a survey on price-change induced circuit breakers,<sup>22</sup> and found that 86% of the responding trading venues used some form of circuit breakers to ensure investor protection and improve market integrity and stability. Of these, market-wide circuit breakers have been most widely adopted, accounting for 72% of circuit breakers in the cash markets.

Where volatility control mechanisms are implemented, they are often designed to take into consideration, amongst others:

- historical instances of extreme market movements that have impacted their respective market (including trading venues' back testing of historical events);
- frequency of limits triggered; and
- input and feedback from the industry and market participants.<sup>23</sup>

In addition, regulatory authorities and/or trading venues have taken into account significant global events and simulations of such events into their review of the effectiveness of their mechanisms.<sup>24</sup>

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<sup>21</sup> In these cases, trading usually but not always resumes through an auction.

<sup>22</sup> Gomber, P., Clapham, B., Haferkorn, M., Panz, S., Jentsch, P., (2016) *Circuit Breakers – A Survey Among International Trading Venues*, Commissioned by WFE.

<sup>23</sup> For example, the extreme volatility in the Canadian equity market on August 24, 2015 showed that prices for leveraged ETFs needed to move in wider increments; hence, IIROC increased the single-stock circuit breaker trigger thresholds to accommodate for the increased potential volatility of these types of securities. Bursa Malaysia Derivatives made changes to the dynamic price limits (DPL) on structured warrants due to frequent requests by its participants to widen the thresholds as the limits were impeding trading opportunities.

<sup>24</sup> See Annex A

### 3. Discussion of Volatility Control Mechanisms

Volatility control mechanisms seek to minimize market disruption caused by trigger events such as:

- a) *Clearly erroneous orders* being submitted at incorrect prices or volumes resulting from manual order entry errors, malfunctioning market participant algorithms or automated order entry systems.
- b) *Large aggressive orders* that create imbalances between liquidity providers and liquidity takers and which may remove all or a significant number of resting orders or trigger a cascade of stop market orders.
- c) *Positive feedback loops* that may occur when large price movements initiate further buying or selling in the same direction, potentially exacerbated by a cascade of stop market orders.

This section describes the rationale for the use of volatility control mechanisms and different approaches taken by trading venues.

#### *i. The Importance of Volatility Control Mechanisms*

Extreme volatility events may undermine the operation of fair and orderly markets and investor confidence. Inadequate, absent or inappropriate measures can impact market stability, integrity and efficiency. Recent experiences and actions undertaken by regulatory authorities and trading venues illustrate a recognition of the importance of volatility control mechanisms. Accordingly, many regulatory authorities and trading venues have been reviewing their approaches toward managing extreme volatility by, for example, introducing mechanisms to temporarily halt or constrain trading.

Trading halts are typically triggered by large price movements taking place within a short time period, and hence represent *ex-post* reactions to excessive price volatility in the market. More recently, trading venues have adopted mechanisms to automatically reject orders that work on an *ex-ante* basis (e.g., preventing the entry of orders outside of certain pre-determined thresholds). Such mechanisms allow trading to continue but executions may only occur within the prescribed thresholds.

The predominant rationales for the adoption of volatility control mechanism(s) cited by trading venues are to:

- a) address significant or abnormal price volatility;
- b) preserve and/or ensure orderly trading;
- c) promote efficient price discovery; and
- d) protect investors and preserve market integrity and confidence in the market.<sup>25</sup>

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<sup>25</sup> In some jurisdictions, where individual investors constitute a sizable proportion of market activity, volatility control mechanisms may also be designed to dissuade excessive speculation and/or extreme price swings with a view to enhancing investor protection.

While trade interventions may help maintain fair and orderly markets, too much intervention can undermine market efficiency. Volatility control mechanisms should be just one component of an overall market resiliency framework that operates alongside other requirements such as proper testing of trading systems controls to check orders prior to entry and stress tests for increased order flows. Where appropriate, volatility control mechanisms should be designed to complement other components of the overall resiliency framework.

As seen recently, extreme volatility events can have a negative impact on market stability, integrity and efficiency and on investor confidence. IOSCO believes that market volatility control mechanisms can be an effective way for trading venues to help mitigate these effects and preserve orderly trading.

**RECOMMENDATION 1 - TRADING VENUES SHOULD HAVE APPROPRIATE VOLATILITY CONTROL MECHANISMS**

Trading venues should establish and maintain appropriate volatility control mechanisms during trading hours in order to manage extreme volatility and preserve orderly trading in a financial instrument on the market.

*ii. Volatility Control Mechanisms*

*(a) Understanding the Applicable Market Structure*

When examining volatility control mechanisms, it is important to understand the market structure in which they operate.

Differences in the approaches to managing excessive volatility reflect differences in market structure and the flexibility needed by regulatory authorities and trading venues. Therefore, a one-size-fits-all model across all asset classes and jurisdictions is not suitable. Differences in liquidity or product types may also necessitate a tailored approach when it comes to the design and functionality of mechanisms to protect the price discovery process and to avoid significant disruptions to orderly trading. For example, the approach taken for securities of large-cap issuers may differ from the approach applied to the securities of small-cap issuers as the volatility profile of each group may be significantly different.

Some have advocated that the use of automated volatility control mechanisms is preferable to the use of mechanisms that involve human intervention. This preference is based on the view that automated mechanisms provide a more transparent and fair response to disorderly markets and anomalous trades than those controls that rely on the exercise of human discretion. Most trading venues benefit from a high degree of automation, especially those that are fully automated and offer continuous trading. However, manual intervention may still be appropriate in some instances, such as for those trading venues that are small in size or operate in a manner other than a continuous order book (e.g. a call market) where the benefits of automation may be absent. Trading venues should consider the specific conditions and structure of their markets to devise an appropriate mix of volatility control mechanisms.

In addition, while most trading venues use some form of volatility control mechanism, the use of such mechanisms may not be appropriate for venues with low trading volume. In such

cases, volatility events may be addressed through other solutions, including, for example reliance on specialists or market makers who can moderate price fluctuations prior to order entry or execution.

In all cases, it is important that the design of volatility control mechanisms takes into account factors such as the size and structure of the particular trading venue, as well as the types of financial instruments traded.

*(b) Types of Volatility Control Mechanisms used by Trading Venues*

Trading venues that have adopted volatility control mechanisms generally use either or both of the following approaches:

- *Price banding*: Executions or order entries may only be made within prescribed price bands. Trading venues in some jurisdictions set wide price bands in order to address all potential extreme volatility events, while others set narrower price bands that may need to be more closely monitored and widened as situations occur. In certain jurisdictions, if no orders are received within the price bands after a certain period, the bands may be adjusted either automatically or pursuant to the trading venue's rule. Once adjusted, order entry and trading may resume within the newly adjusted price bands. In other jurisdictions, if orders are not received within the price bands, a trading halt or trading pause is triggered;
- *Trading halts*: In the case of single-stock circuit breakers, trading of a particular financial instrument is halted for a period of time, which may be up to several minutes once an order is received or a trade occurs at a price that exceeds the pre-determined thresholds. During these trading halts, order books are generally open for order entry, modification and cancellation. Should an initial trading halt not achieve the desired result, that trading venue may decide either to extend it or to initiate additional trading halts. By contrast, market-wide circuit breakers reference the general movement of the market (normally by reference to an index) rather than the price movement of a single financial instrument. When the index moves more than a predetermined threshold, trading of all securities on the trading venue or within a jurisdiction is halted. The length of the halt is usually predetermined and usually depends on the time when the halt occurs and whether there is sufficient time left in the trading day or session to reopen the market without the risk of it undermining market integrity, fairness and efficiency.

When the triggering of a volatility control mechanism results in a trading halt, the length of the halt and how trading resumes following the halt are important design considerations.

Volatility control mechanisms are usually active during continuous trading sessions. However, many jurisdictions also apply such mechanisms to auction sessions: in these cases, the auction is delayed when the indicated auction price falls outside of the pre-defined thresholds.

Most volatility control mechanisms rely on reference prices that may be static, dynamic or a combination of both:

- *Static Reference Prices* – Static reference prices remain constant for an extended period, usually a trading day. They are generally set by the closing or opening price of a particular financial instrument or index. Static reference prices are generally wider than dynamic reference prices and are designed to address volatility events that occur over a longer period of time compared to dynamic measures.
- *Dynamic Reference Prices* – Dynamic reference prices are generally calculated on a continuous basis. The calculation method varies and can be as simple as referencing the current quote or last trade in a particular security or index, or have a more complex calculation, taking into consideration the activity during the prior, pre-specified period. Dynamic reference prices are usually set tighter than static reference prices so as to address volatility events that occur over a short period of time, such as those that may be triggered by extreme and rapid liquidity demands.

*(c) Calibration of Mechanisms*

When developing a volatility control mechanism, an appropriate calibration of the reference prices or thresholds is important. Various factors may be considered, including:

- the nature of the financial instrument or underlying asset;
- the liquidity and volatility profile of the specific instruments and asset classes/sub-classes; and
- the price of the financial instrument.

These factors help ensure that mechanisms are not applied too broadly and do not react to the normal volatility of a particular financial instrument. Few jurisdictions apply a one-size-fits-all approach when calibrating volatility control mechanisms.

With respect to liquidity, in some cases, volatility control mechanisms are only applied to financial instruments that are deemed “liquid”. In other cases, all financial instruments may be covered by the mechanism and liquidity is considered when establishing the specific thresholds. In the latter case, less liquid financial instruments are generally subject to wider thresholds.

When setting thresholds for volatility control mechanisms, the value or price of a financial instrument is usually taken into account, either in absolute or percentage terms. For example, some trading venues “bucket” financial instruments based on value and apply different thresholds to each bucket.<sup>26</sup>

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<sup>26</sup> For example, ASIC requires certain securities markets (e.g. the Australian Securities Exchange and Chi-X Australia) to apply an Automated Order Threshold to reject aggressive orders that are a certain distance from a reference price. The price band varies based on the value of the security. Similarly, IIROC requires all Canadian marketplaces to employ marketplace thresholds that reject any order that upon execution exceeds the calculated reference price by a certain percentage. The percentage varies from 10% - 300% and is based on the trading price of the security.

It is also important to consider that the minimum price movement, in absolute terms, will be more dramatic for lower-priced financial instruments than higher-priced ones. Alternatively, when a threshold price movement is expressed as a percentage increase or decrease from the reference price, lower-priced financial instruments generally require a higher percentage price movement to trigger a volatility control mechanism.

Trading venues that trade derivatives often have different modes of establishing thresholds for volatility control mechanisms differently and in some cases, models may be used to establish appropriate thresholds. In such cases, the model price may consider the trading price of the underlying product. Order entry and execution is permitted to occur so long as the modeled or calculated price of the derivative aligns with the value of the underlying product. Any interruption to trading would only occur when the price of the derivative does not align with the theoretical price or price of the underlying product.

Because the effectiveness of volatility control mechanisms is heavily dependent on the thresholds used, IOSCO believes that it is vital these thresholds are appropriately calibrated by trading venues using relevant factors to ensure that the mechanisms are applied when necessary and do not interfere during times of normal volatility of a financial instrument.

#### **RECOMMENDATION 2 – CALIBRATION OF VOLATILITY CONTROL MECHANISMS**

Trading venues should ensure that volatility control mechanisms are appropriately calibrated. To do so, trading venues may consider the following non-exhaustive list of elements:

- a) the nature of the financial instrument or underlying asset e.g. a security, ETF or derivative.
- b) the liquidity or trading profile of the financial instrument.
- c) the volatility profile of the financial instrument or underlying product.
- d) volatility control mechanisms in place for related financial instruments and/or markets.
- e) price of the financial instrument.

##### *(d) Management of Volatility Control Mechanisms*

Volatility control mechanisms require regular monitoring to ensure they continue to work as designed and remain effective.

##### *(i) Initial Testing of Mechanisms*

It is standard practice for volatility control mechanisms to be tested prior to implementation to ensure that the mechanisms work as intended (i.e. function testing to test for consistency with the functional requirements). Trading venues may also conduct testing with other market participants prior to implementation to ensure the mechanisms interact appropriately with the marketplace.

## (ii) Monitoring of Mechanisms

IOSCO believes that regular monitoring of volatility control mechanisms is important to make sure that such mechanisms continue working as designed and remain effective. Trading venues may conduct this type of monitoring by:

- conducting regular reviews of the mechanisms;
- ensuring that the mechanisms are adapted to market changes; and
- adjusting mechanisms where warranted.

Some trading venues review the mechanisms on a periodic basis (such as quarterly, bi-annually or annually), while others do not set specific timeframes but conduct reviews continuously or on an ad-hoc basis when necessary (for example, if requested by market users).

Reviews typically take into account information such as the number of order rejections recorded with existing thresholds, previous trade cancellation requests, the number and nature of trigger events, feedback from market participants and changes made by other market operators for the same or underlying products. Product specific factors may also be considered, including corporate actions and changes to the liquidity profile of the instrument.

Some trading venues have designed volatility control mechanisms with wide price bands or thresholds intended to address all potential extreme volatility situations. In such cases, there is no discretion to modify or suspend a volatility control mechanism in response to a specific volatility event and the price bands or thresholds are consistently applied at all times. These jurisdictions believe that a consistent and reliable approach increases investor participation in the market during volatility events by providing certainty on how orders will be handled.

Other trading venues have implemented narrower price bands or thresholds but have the discretion to temporarily adjust or suspend a volatility control mechanism in accordance with their rules policies or requirements. The circumstances and factors that determine whether a modification is appropriate are reviewed on a case-by-case basis. Trading venues may consider whether the automatic trigger or thresholds are appropriate to maintain the integrity of the market and preserve orderly trading in specific situations.<sup>27</sup> These circumstances and factors may include, for example, reopening trading after an extended period of market closure, and geopolitical events.<sup>28</sup>

Regardless of the approach taken, IOSCO believes that it is essential that volatility control mechanisms are regularly monitored and that the mechanisms, including applicable thresholds (if authorized by law or in accordance with a trading venue's rulebook) are adjusted as necessary to ensure that they work as intended and do not unnecessarily interfere with the normal price discovery process.

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<sup>27</sup> For example, in Canada IIROC may, with notice, temporarily widen the price thresholds of a particular security in response to an extraordinary event where increased volatility may be considered "normal" trading activity.

<sup>28</sup> On November 8, 2016, in advance of the U.S. presidential election, IIROC widened the price thresholds applicable to its single-stock circuit breaker program to accommodate the potential for increased volatility (IIROC Notice 16-0256 – November 8, 2016).



**RECOMMENDATION 3 – MONITORING OF VOLATILITY CONTROL MECHANISMS**

Trading venues should regularly monitor volatility control mechanisms to make sure they are working as designed and to identify circumstances that would require the mechanisms to be re-calibrated.

## 4. Regulatory Oversight of Volatility Control Mechanisms and Information to Regulators

In C2 member jurisdictions, there are three main approaches to regulatory oversight of volatility control mechanisms. Under the first approach, regulatory authorities in some jurisdictions impose a general requirement that trading venues must operate fair and orderly markets,<sup>29</sup> but do not specifically require trading venues to employ volatility control mechanisms. To satisfy their obligation to operate fair and orderly markets, trading venues in these jurisdictions have in practice established, to varying degrees, rules or mechanisms for managing extreme volatility.<sup>30</sup> Consequently, trading venues may have provisions in their rules setting out, for example, the thresholds for triggers, the duration of a trading halt, or the means for determining opening prices following an interruption.<sup>31</sup>

Under the second approach, trading venues in certain jurisdictions are specifically required to use volatility control mechanisms, but are given discretion in determining the precise methodology<sup>32</sup> to use with varying degrees of specificity on how these mechanisms must operate. In the E.U., for example, the MiFID II regime contains detailed provisions and guidelines,<sup>33</sup> while other jurisdictions provide more flexibility to trading venues in determining the appropriate volatility control mechanisms.<sup>34</sup>

Under the third approach, regulatory authorities in other jurisdictions take a more direct approach to volatility control mechanisms and provide detailed requirements on how these mechanisms must operate.<sup>35</sup> For example, the rules of the Investment Industry Regulatory Organization of Canada (IIROC) provide price thresholds within which executions may occur on a trading venue, as well as other controls on volatility, such as the duration of a trading halt caused by the breach of a price threshold. The Australian Securities and Investments Commission (ASIC) similarly provides an “extreme trade range threshold” and sets the duration of a volatility interruption.

With respect to implementing these three approaches to regulatory oversight of volatility control mechanisms, in a few member jurisdictions, the regulatory authority has direct statutory authority to set certain mechanisms and thresholds.<sup>36</sup> In others, the trading venue sets thresholds with some manner of regulatory oversight (such as with respect to the requirement to notify the regulatory authority of the thresholds, set the thresholds through consultation with, or oversight by, the regulatory authority, or through direct approval by the

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<sup>29</sup> The precise language varies among the jurisdictions.

<sup>30</sup> See Annex A

<sup>31</sup> See Annex A

<sup>32</sup> See Annex A

<sup>33</sup> See Annex A

<sup>34</sup> For example, Japan’s Financial Services Agency allows trading venues to design their volatility control mechanisms, which are then subject to regulatory approval.

<sup>35</sup> These jurisdictions include: Canada, Australia, Russia, and India.

<sup>36</sup> See Annex A

regulatory authority).<sup>37</sup> In the majority of jurisdictions, trading venues set thresholds with regulatory approval.<sup>38</sup>

Regulatory authorities generally require trading venues to keep books and records. Trading venues commonly maintain records of their rules, policies and procedures and records relating to the operation, triggering and monitoring of the volatility control mechanisms. IOSCO believes that maintaining relevant records is important from both a governance and supervisory perspective, to facilitate the effective oversight, use and management of these mechanisms by relevant regulatory authorities and trading venues.

**RECOMMENDATION 4 – INFORMATION NECESSARY FOR REGULATORY AUTHORITIES TO MONITOR THE VOLATILITY CONTROL MECHANISM FRAMEWORKS**

Regulatory authorities should consider what information they require to effectively monitor the overall volatility control mechanism framework in their jurisdiction, and make sure that trading venues maintain relevant records.

Nearly all regulatory authorities have some access to information regarding the specific triggering of a volatility control mechanism and may obtain this information in one or more of the following ways:

- a) *Information through internal, third-party, or public information channels.* Many regulatory authorities have real-time access to information about the triggering of automatic volatility control mechanisms through internal, public, or third-party information channels.<sup>39</sup>
- b) *Through direct notification by the trading venue in certain circumstances.* Other regulatory authorities can receive information through trade reports from regulated trading venues, whether tied to the triggering of a volatility control mechanism or pursuant to a periodic reporting obligation.<sup>40</sup> Reporting obligations may be based on the underlying product(s) or volatility conditions, and/or the exercise of discretion or emergency action by the trading venue.<sup>41</sup>
- c) *Upon request by the regulatory authority.* Some regulatory authorities may request information from trading venues and other relevant stakeholders (such as the issuer or SROs), when a volatility control mechanism is triggered, whether in real-time or after the fact.<sup>42</sup>

To ensure regulatory authorities can fulfill their responsibilities to monitor the overall effectiveness of the volatility control mechanisms framework in their jurisdictions, IOSCO

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<sup>37</sup> See Annex A

<sup>38</sup> These jurisdictions include: Australia, Brazil, Canada, China, Dubai, Hong Kong, Japan (both METI and JFSA), Korea, Malaysia, Mexico, Saudi Arabia, and SEC.

<sup>39</sup> See Annex A

<sup>40</sup> See Annex A

<sup>41</sup> See Annex A

<sup>42</sup> See Annex A

believes that trading venues should make available to regulators information regarding the volatility control mechanisms they use.

**RECOMMENDATION 5 – INFORMATION REGARDING TRIGGERING OF VOLATILITY CONTROL MECHANISMS TO REGULATORY AUTHORITIES**

Trading venues should make available upon request by their regulatory authority information about the execution of any volatility control mechanism.

## 5. Dissemination of Information to Market Participants and the Public

IOSCO believes that market participants and, if appropriate, the public should have information regarding the types of volatility control mechanisms in place on a particular trading venue, and how a mechanism may be triggered.

For market participants, the following information about trading halts can be very important:

- how a trading halt is triggered;
- the type of trading halt;
- the trading phase in which it was triggered; and
- any applicable extensions of the halt and the end of the halt.

Although trading venues usually report specific thresholds to the regulatory authority and disclose the general policies and arrangements to manage its volatility control mechanisms, the specific thresholds that trigger volatility control mechanisms may not be publicly disclosed. This may help prevent potential abuse and gaming of the mechanism, such as the deliberate triggering of a volatility control mechanism (for example, intentionally triggering a stock halt when the market is moving in an unfavorable direction). However, even in such a case, it may be helpful to market participants if the trading venues publically provide a general description of the relevant thresholds of their volatility control mechanisms and how they are calibrated.

Trading venues generally make some information available about their rules, policies and procedures regarding volatility control mechanisms, whether to regulatory authorities, market participants, and/or the market as a whole. In most cases, trading venues also disseminate various kinds of information when a volatility control mechanism is triggered, including, for example, the type of trading halt, the trading phase in which it was triggered, any extensions to the halt, and when regular trading resumes.

### *Information about volatility control mechanisms and thresholds*

The majority of regulatory authorities require trading venues to publicly disseminate information about the volatility control mechanisms they employ although the degree of prescriptiveness of these requirements and the discretion that is afforded to trading venues vary across jurisdictions.

Many regulatory authorities specifically require the publication of a trading venue's rules regarding volatility control mechanisms pursuant to a specific legal requirement.<sup>43</sup> Others have general requirements that trading venues ensure an orderly, informed and fair market, and therefore trading venues are expected to disseminate important information to the market, which includes information about volatility control mechanisms.<sup>44</sup>

In practice, a significant number of trading venues have rules, policies, and procedures related to volatility control mechanisms described in their rulebooks that are typically

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<sup>43</sup> See Annex A

<sup>44</sup> CNBV (Mexico), Capital Market Authority (Saudi Arabia), MAS (Singapore)

approved or reviewed by the regulatory authority. These rules, policies and procedures, and any changes to them, are usually available on the website of the trading venue.

When changes are made to the volatility control mechanisms, market participants are often notified, either prior to, or at the time of, implementation so that trading venue members can make themselves familiar with the new or modified characteristics of the mechanisms.<sup>45</sup>

So, in most circumstances, the general design of the volatility control mechanism used is disclosed to both the regulatory authority and the public. However, with respect to the specific reference prices or thresholds used, some trading venues disclose the specific thresholds at which volatility control mechanisms are triggered,<sup>46</sup> while others do not.<sup>47</sup> As noted above, some trading venues are reluctant to disclose the specific thresholds used to market participants and/or the public so as to prevent the potential misuse and gaming of the mechanism.

IOSCO is of the view that it is important for market participants and, if appropriate, the public to be sufficiently informed about the volatility control mechanisms that are used by a trading venue. The disclosure of such information enables market participants to understand the general nature and operation of the volatility control mechanism and is important to maintain fair and orderly markets.

**RECOMMENDATION 6 – COMMUNICATION OF INFORMATION ABOUT VOLATILITY CONTROL MECHANISMS TO MARKET PARTICIPANTS AND THE PUBLIC**

Trading venues should communicate sufficient information to market participants and if appropriate, the public, for them to understand the nature and operation of the volatility control mechanisms used.

Some trading venues are required to inform market participants and the public when a volatility control mechanism is triggered and also provide specific additional information such as the type of trading halt, the trading phase in which it was triggered, the extension of the halt and the end of the halt.<sup>48</sup>

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<sup>45</sup> E.g., Sibex (Romania) and Euronext (NE). (Sibex noted that it publishes any changes on its webpage at least 24 hours before taking effect.)

<sup>46</sup> For example, a trading venue in Canada, TSX (Canada), reported that the MWCB threshold mechanism and threshold limits are described in detail and posted on its website; however, it reported that threshold limits for certain other instrument types (which were not specified) are not publicly disclosed. The trading venues in the United States reported that MWCB and LULD thresholds are publicly disclosed.

<sup>47</sup> For example, a trading venue in the Middle East (Tadawul (Saudi Arabia)) reported that it only discloses the fluctuation limits of its volatility control mechanisms; a trading venue in Asia (CLTX (Singapore)) reported that only the policies relating to the mechanisms to manage volatility are publicly disclosed; a trading venue in North America (TSX (Canada)) likewise reported that the specific thresholds underlying how VCMs are triggered are not publicly disclosed.

<sup>48</sup> U.S. (SEC), EU jurisdictions under MiFID II and ESMA Guidelines; SC (Malaysia); FSC-FSS (South Korea). Under ESMA's final guidelines on trading halts under MiFID II, trading venues in EU member jurisdictions will be required to immediately make public through the means regularly used to make available pre- and post-trade information the activation of a trading halt, the type of trading halt, the trading phase in which it was triggered, the extension of the halt and the end of the halt. In the U.S., the information about trading halts is communicated in real-time to the public over the U.S. consolidated tapes.

Trading venues that inform market participants when a volatility control mechanism is triggered typically do so by way of real-time, automated alerts or messages through platform-based messaging systems or market data feeds.<sup>49</sup> Trading venues tend to inform participants both when the mechanism is triggered, as well as upon the resumption of regular trading. Some trading venues also notify individual participants immediately if any of their orders are rejected as a result of an active volatility control mechanism.<sup>50</sup>

Trading venues may provide different information to affected participants and to the public. Most trading venues indicated that they inform market participants directly when a volatility control mechanism is triggered but many indicated that they also notify the public. Several noted that they inform the public when a market-wide volatility control mechanism is triggered, but not necessarily when other types of halts, such as a single-stock circuit breaker, are triggered.<sup>51</sup> Some trading venues reported that they only inform the public when a market-wide circuit breaker is triggered and information is posted immediately on their website.<sup>52</sup> Other trading venues responded that they notify the public some period of time after market participants are notified (which is usually automatic and in real-time).<sup>53</sup>

Aside from identifying what information should be communicated, consideration should also be given to the communication channels used. These may include public (e.g. website or social media) or private channels such as a data feed to market participants.

In an extreme volatility event, IOSCO believes that market participants and if appropriate, the public should have sufficient information about the triggering of a volatility control mechanism. Specifically, market participants should be aware of the event and be provided the opportunity to add or remove liquidity and adjust booked orders when the market resumes as this should assist the return to normal market conditions.

**RECOMMENDATION 7 – COMMUNICATION TO MARKET PARTICIPANTS AND THE PUBLIC WHEN A MECHANISM IS TRIGGERED**

Trading venues should make available to market participants, and if appropriate the public, information regarding the triggering of a volatility control mechanism. Information to market participants should be provided promptly.

<sup>49</sup> E.g., LSE(United Kingdom), CME (U.S.); BME (Spain)

<sup>50</sup> E.g., ISE (Ireland); NXCL (Canada)

<sup>51</sup> For example, a trading venue in Canada reported that it publishes information on its website in the event of a market-wide halt, but informs market participants “who are connected or receive information directly from [the venue] or through a third party” about a broader number of events, namely whenever a volatility auction, single-stock or market-wide halt occurs.

<sup>52</sup> KRX (South Korea)

<sup>53</sup> For example, a trading venue in South Africa (4X (South Africa)) noted that all data is automatically disseminated to authorized users of the platform when a VCM is triggered, and such data is then made available (with a 15 minute lag) on the venue’s public information portal “for anyone to access”.

## 6. Communication Between Trading Venues

When a volatility control mechanism is triggered, communication between trading venues is important. Communication is particularly relevant where the same instruments are traded across multiple trading venues in the same jurisdiction, which is the case for many instruments.<sup>54</sup> However, where the trading of financial instruments is concentrated on a single trading venue<sup>55</sup> such communication is less relevant. Communication is also important where related instruments trade on separate trading venues. For example, most derivatives trade on separate trading venues from that of the underlying instrument.

Many jurisdictions have either implemented various communication options as regulatory requirements or have addressed these at the trading venue level. In examining the various approaches, it is worth noting that:

- if a jurisdiction has more than one trading venue trading the same or related instruments, requirements for communication between trading venues and/or a common set of rules or requirements are relevant. If trading in a financial instrument is halted on one trading venue, several jurisdictions will halt all trading in that financial instrument,<sup>56</sup> while others allow trading to continue on other trading venues or OTC;<sup>57</sup>
- if regulatory authorities establish detailed requirements regarding volatility control mechanisms (i.e. describe the procedure for determining the threshold values that warrant suspension of trading or determine the duration of the trading suspension) the issue of consistency of application across venues should be considered;<sup>58</sup> and
- in jurisdictions with more general requirements for volatility control mechanisms, trading venues are usually required to cooperate when establishing a volatility control mechanism, or to enter into information sharing agreements/MOUs/other understandings or agreements with relevant foreign or domestic trading venues that trade the same or related instruments, (including related derivatives) for purposes of coordinating their respective volatility control mechanisms.

Even where there are no regulatory requirements for communication, some trading venues have established communication with other foreign venues trading in the same or related instruments. This communication could be established through a formal bilateral agreement<sup>59</sup>

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<sup>54</sup> In many cases the number of venues is significant such as in the UK, which is comprised of over 70 MTFs and 7 regulated markets providing a variety of execution options. In the U.S., trading is dispersed among many highly automated trading centers including registered exchanges and ATSS and broker-dealers. In Canada, securities are traded on several registered exchanges and ATSS.

<sup>55</sup> In Hong Kong, for example, all securities are traded on a single venue and all futures and options contracts are traded on a single venue. Similarly in Korea, the Korea Exchange (KRX) is the only designated trading venue.

<sup>56</sup> These jurisdictions include: U.S. – SEC, Australia, Malaysia, Mexico, Canada.

<sup>57</sup> These jurisdictions include: U.S. – CFTC, MiFID jurisdictions, Hong Kong, Korea, Japan – FSA, Dubai, Russia.

<sup>58</sup> More detailed requirements are established, for example, in Australia, Canada, Russia, Saudi Arabia, U.S.

<sup>59</sup> For example, Brazil and CME Group (Chicago Mercantile Exchange) hold an agreement denominated Cross Listing in the Derivatives Segment, which requires immediate communication by one exchange to the other in the



or more informally; for example, the trading venue may draw up a list of relevant contacts at cross border venues that trade the same or related instruments. Organizations such as the WFE may also facilitate this type of informal communication through contact lists that its members can use. Groups such as the Intermarket Surveillance Group may also be useful forums to facilitate the exchange of information on the operation of volatility control mechanisms and discuss issues such as repeat patterns of triggering volatility control mechanisms through the operation of particular algorithms. The type of communication may be passive – such as where a trading venue receives real time data feeds from relevant jurisdictions or active – such as where the trading venue communicates directly with other trading venues.

One of the main considerations for the need and method of communication is whether the volatility event could affect trading venues in other jurisdictions.<sup>60</sup> In addition, the need for communication may depend on the nature of the volatility event, for example, whether it relates to a single-stock or is a market-wide halt. Market-wide halts, in particular, if triggered in large markets may affect trading venues in other jurisdictions. Another consideration is whether the other jurisdictions' venues trade the same or related instruments, such as futures or ETFs. In addition, information that is communicated could be useful for other venues to analyze their own market behavior.

Finally, sharing historical information, such as data on the triggering of volatility control mechanisms, may facilitate the analysis of market events or specific trading activity that may have contributed to a volatility event. This information may assist reviews of the impact and effectiveness of a volatility control mechanism.

IOSCO believes that communication by trading venues both within their own jurisdiction and outside their jurisdiction can be an essential component in effectively responding to extreme volatility events or assessing their effectiveness ex-post and should be considered when appropriate.

#### **RECOMMENDATION 8 – COMMUNICATION BETWEEN TRADING VENUES**

Where the same or related instruments are traded on multiple trading venues in the same jurisdiction, trading venues should communicate as appropriate when volatility control mechanisms are triggered. Where the same or related instruments are traded in different jurisdictions and the mechanism is triggered, communication may be appropriate.

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case of a standstill scenario with one of the cross-listed instruments. The duly informed exchange shall decide upon the procedures to be adopted, with this not being a mandatory obligation.

<sup>60</sup> See introduction for examples of such events.

## 7. Conclusion

As discussed in this Report, the importance of implementing volatility control mechanisms is recognized by trading venues and regulatory authorities globally. IOSCO believes that these mechanisms support the goal of ensuring that markets are “fair, efficient and transparent”. As a result, IOSCO sets out the following eight recommendations.

- Trading venues should establish and maintain appropriate volatility control mechanisms during trading hours in order to manage extreme volatility and preserve orderly trading in a financial instrument on the market.
- Trading venues should ensure that volatility control mechanisms are appropriately calibrated. To do so, trading venues may consider the following non-exhaustive list of elements:
  - a) the nature of the financial instrument or underlying asset e.g. a security, ETF or derivative;
  - b) the liquidity or trading profile of the financial instrument;
  - c) the volatility profile of the financial instrument or underlying product;
  - d) volatility control mechanisms in place for related financial instruments and/or markets; and
  - e) price of the financial instrument.
- Trading venues should regularly monitor volatility control mechanism to make sure they are working as designed and to identify circumstances that would require the mechanisms to be re-calibrated.
- Regulatory authorities should consider what information they require to effectively monitor the overall volatility mechanism framework in their jurisdiction, and make sure that trading venues maintain relevant records.
- Trading venues should make available upon request by their regulatory authority information about the execution of any volatility control mechanism.
- Trading venues should communicate sufficient information to market participants and if appropriate the public, for them to understand the nature and operation of the volatility control mechanisms used.
- Trading venues should make available to market participants and, if appropriate the public information regarding the triggering of a volatility control mechanism. Information to market participants should be provided promptly.
- Where the same or related instruments are traded on multiple trading venues in the same jurisdiction, trading venues should communicate as appropriate when volatility mechanisms are triggered. Where the same or related instruments are traded in different jurisdictions and the mechanism is triggered, communication may be appropriate.

## Appendix A

Footnote 23	Examples of significant events that were simulated in reviews and which resulted in changes	<ul style="list-style-type: none"> <li>• The U.S. SEC implemented several measures in response to the Flash Crash. For example, the SEC approved the “Limit Up Limit Down Plan” and updated its market-wide circuit breaker rules. In addition, the SEC approved amendments to the clearly erroneous execution rules and eliminated stub quotes. The U.S. SEC monitors and evaluates extreme volatility events and the mechanisms in place to address them;</li> <li>• The “flash crash” of May 2010 resulted in South Korea’s KRX reviewing its circuit breaker mechanisms and the introduction of new dynamic volatility intervention mechanism in 2014, supplemented by both a static threshold in 2015 and followed by a kill switch mechanism in 2016;</li> <li>• Euronext has made adjustments to tighten its static threshold levels following an incident in 2016.</li> <li>• On June 24, 2016, because Brexit led to a high number of single instrument trading halts, the market operator of the regulated market (Bolsa de Madrid) broadened the static range of all stocks to 25% and notified the regulator of this change. Spain also has conducted several studies which evidence the effectiveness of circuit breakers to address volatility.</li> </ul>
Footnote 29	Jurisdictions that impose a general requirement that trading venues must operate fair and orderly markets, but do not specifically require trading venues to employ volatility control mechanisms	Hong Kong, Malaysia, Turkey, Mexico, U.S., Japan, Dubai, China and Saudi Arabia. For example, Hong Kong’s Securities and Futures Ordinance (SFO) provides high-level regulatory requirements for its trading venues, including statutory duties to ensure a fair, informed and orderly market. Trading venues are required to ensure that risks associated with their business and operations are managed prudently, however, there is no provision in the SFO that specifically requires the exchanges to apply mechanisms to manage market volatility. Mexico’s Security Market Law requires trading venues in its jurisdiction to issue internal regulation that sets surveillance activities to preserve orderly securities trading and the correct price formation,

		and have mechanisms to ensure market integrity.
Footnote 30	Trading venues that have provisions in their rules setting out the thresholds for triggers, the duration of a trading halt, or the means for determining opening prices following an interruption	For example, in the U.S., the U.S. self-regulatory organizations (SROs), including U.S. exchanges and FINRA have developed and operate a National Market System Plan to Address Extraordinary Market Volatility (also known as the Limit-Up Limit-Down Plan or LULD Plan). The LULD Plan contains specific provisions related to, for example, how reference prices and price bands are calculated for individual stocks, how trading pauses are declared, the length of trading pauses, the information about trading pauses that is disseminated to the public, and how trading resumes after a pause
Footnote 31	Trading venues in certain jurisdictions are specifically required to use volatility control mechanisms, but are given discretion in determining the precise methodology	Italy, Romania, Ireland, Netherlands, Germany, Spain, France, UK (collectively MiFID jurisdictions), South Africa, Korea and Brazil. For example, South Africa's laws require trading venues to have a mechanism to manage volatility and preserve orderly trading in the markets, but are not specific to the extent of prescribing the specific mechanism that trading venues must employ, nor do they specify the scope of instruments to be covered. MiFID II requires trading venues to be able to temporarily halt or constrain trading if there is a significant price movement in a financial instrument on that market or a related market during a short period.
Footnote 32	MiFID II guidelines	The MiFID II guidelines require trading venues to calibrate their volatility thresholds according to a methodology that takes into account the nature of the financial instrument, its liquidity and volatility profile, as well as the trading mode and rules of the trading venue. These guidelines also require that trading venues have systems in place to ensure they notify competent authorities so that the authorities are able to coordinate a market-wide response and determine whether it is appropriate to halt trading on other venues on which the financial instrument is traded. These guidelines also provide that a trading venue's circuit breakers should use static and dynamic reference prices unless the trading venue can demonstrate to its regulator that volatility can be adequately measured with only static or dynamic reference prices. These new guidelines went into effect on January 3, 2018.
Footnote 35	In a few member jurisdictions, the	These jurisdictions include: Australia (ASIC determines extreme trade range thresholds in its

	regulatory authority has direct statutory authority to set certain mechanisms and thresholds	Market Integrity Rules (MIRs) but is required to consult before making or amending MIRs), Canada (IIROC sets the thresholds for market-wide circuit breakers, single-stock circuit breakers and marketplace thresholds following a public consultation process), India (SEBI prescribes the thresholds for market-wide circuit breakers), and Russia (regulations set out detailed requirements for circuit breakers). However, in none of these four jurisdictions does the regulator have sole authority over all volatility mechanisms and thresholds: in Australia, market operators may set anomalous order thresholds with notice to and oversight by ASIC; in Canada, trading venues may set more restrictive thresholds than those set by the regulator, upon approval from the applicable securities commission; in India, there are weekly surveillance meetings between trading venues and the regulator to discuss market safety and integrity issues; and in Russia, exchanges may create other mechanisms or set stricter limits and thresholds, with regulatory approval.
Footnote 36	Examples of trading venue that set thresholds with some manner of regulatory oversight	Jurisdictions include: India, MiFID II jurisdictions, South Africa, and Turkey. In the EU, MiFID II (beginning in January 2018) will require venues to report the thresholds for halting trading and any material changes to those thresholds to the competent authority in a consistent and comparable manner, and the competent authority shall in turn report them to ESMA. ESMA has established a common reporting template for the relevant national authorities and the trading venues under its jurisdiction to describe details of the mechanisms in place.
Footnote 38	Regulators that have real-time access to information about the triggering of automatic volatility control mechanisms through internal, public, or third-party information channels	Some regulators reported that they have access in real time to the relevant information through market data feeds [The U.S. Securities and Exchange Commission (SEC), the Securities Commission (SC) (Malaysia), the Monetary Authority of Singapore (MAS), Securities and Futures Commission (SFC) (Hong Kong) and the Financial Services Agency (FSA) (Japan)]. One regulator has access to general trade data from designated contract markets (i.e., traditional futures exchanges, or DCMs) in real time through subscription-based market data feeds [U.S. Commodity Futures Trading Commission (CFTC)]. Others reported that they can access real-time trading data through market data feeds

		and/or internal market surveillance efforts [The Comisión Nacional Bancaria y de Valores (CNBV) (Mexico), ASIC (Australis), IIROC (Canada)]
Footnote 39	Regulators that can receive information through trade reports from regulated trading venues, whether tied to the triggering of a volatility control mechanism or pursuant to a periodic reporting obligation	The CFTC requires DCMs and other reporting markets to submit daily trade and supporting data reports that may, if requested, include information regarding the use of a specific volatility control mechanisms, as well as related trade data in the period before and after the mechanism is triggered. For futures trading, ASIC also receives daily files for surveillance and supervision data on a T+1 basis. MAS additionally requires trading venues to submit a report within 14 days when an index circuit breaker is triggered, describing the remedial actions taken at the time of the occurrence, and the subsequent follow-up actions that the venue has taken or intends to take.
Footnote 40		In the EU, MiFID II imposes the requirement that where a trading venue which is material in terms of liquidity in that financial instrument halts trading, that trading venue has the necessary systems and procedures in place to ensure that it will notify competent authorities in order for them to coordinate a market-wide response and determine whether it is appropriate to halt trading on other venues on which the financial instrument is traded until trading resumes on the original market. Accordingly, under MiFID II trading venues need to notify the relevant authority whenever the venue halts trading in a regulated market that is material in terms of liquidity. (SC) (Malaysia) imposes a notification requirement when an index circuit breaker is triggered. Other authorities such as the Dubai Financial Services Authority (DFSA) and the MAS impose a notification requirement if a venue exercises discretion to halt trading. Others such as the CFTC require notification if a DCM takes any emergency action, which can include the suspension or curtailment of all trading in a contract.
Footnote 41	Regulatory authorities that request information from trading venues and other relevant stakeholders (such as the issuer or SROs),	For example, the SEC reported that in the case of market-wide events, it maintains communication with SROs, and that depending on the circumstances, it will request additional information from the relevant SRO after a volatility event. The Financial Services Commission (FSC) and Financial Supervisory

	<p>when a volatility control mechanism is triggered, whether in real-time or after the fact</p>	<p>Service (FSS, and together, FSC-FSS) (South Korea), and South African Financial Services Board (FSB), for example, each also noted that they can access information about the triggering of volatility interruptions on all of its regulated trading venues upon request. MAS reported that it expects to be notified as soon as practicable, and that such communications often take the form of call updates, so that the MAS obtains as close to real time information as possible. The Autorité des marchés financiers (AMF) (France) noted that trading venues have formalized procedures to contact the regulator in specific instances, such as the occurrence of large price movements on blue chip securities or other atypical situations on other liquid equity securities. In such cases, the trading venue contacts the AMF by phone and then by email to inform the regulator when the mechanism is triggered. The AMF may also contact the issuer of the relevant instrument for the purpose of verifying the information that led to trigger of the volatility control mechanisms.</p>
Footnote 42	<p>Regulators that specifically require the publication of a trading venue’s rules regarding volatility control mechanisms pursuant to a specific legal requirement</p>	<p>In the U.S. equity markets, volatility control mechanisms are published (i.e., the “Limit Up-Limit Down Plan” and MWCB rules), and any amendments thereto, are published on the SRO websites and any amendments thereto would be subject to public notice and comment and approval by the SEC. Further, rules related to trading halts are published on the SROs’ websites and any amendments thereto would be subject to notice and comment. The AMF Quebec, IIROC and OSC similarly reported that detailed information about volatility control mechanisms is first published for public comment and subsequently published as final guidance on IIROC’s website. IIROC guidance additionally sets out that each trading venue must publicly disclose a detailed description of the mechanism it uses to implement marketplace thresholds, including specific examples of how an order that triggers a marketplace threshold will be handled by that trading venue. ASIC also imposes relatively detailed requirements: the relevant requirements are published on ASIC’s website, and trading venues must publish their operating rules, policies and procedures on their individual websites. Trading venues are further required make information about anomalous order</p>

		<p>thresholds publicly available prior to their adoption, including each time the thresholds change, and must have transparent cancellation policies. Under the CFTC’s principles-based framework, DCMs disclose information about volatility control mechanisms pursuant to the requirement that they make publicly available accurate information about such things as “the rules, regulations and mechanisms for executing transactions [...] and the rules and specifications describing the operation of the contract market’s electronic matching platform or trade execution facility,” as well as the principle that DCMs must “ensure that authorities, market participants, and the public have available all material information pertaining to [...] trading and product rules, or other changes to information previously disclosed by the DCM.”</p>
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## Appendix B

### Summary of Comments Received MECHANISMS USED BY TRADING VENUES TO MANAGE EXTREME VOLATILITY AND PRESERVE ORDERLY TRADING

Comments received from:

- Blackrock (BR)
- CBOE (CBOE)
- CME Group (CME)
- Deutsche Borse Group (DB)
- Euronext (EU)
- FIA (FIA)
- Finanstilsynet Danish FSA (DFSA)
- ICE Futures (ICE)
- Nasdaq (Nasdaq)
- NEX (NEX)
- World Federation of Exchanges (WFE)

	Summary of Comment Received	IOSCO Response to Comment
<p><b>RECOMMENDATION 1- TRADING VENUES SHOULD HAVE APPROPRIATE VOLATILITY CONTROL MECHANISMS</b></p> <p>Trading venues should establish and maintain appropriate volatility control mechanisms during trading hours in order to manage extreme volatility and preserve orderly trading in a financial instrument on the market.</p>	<p><b>(BR)</b> Single security controls and market-wide controls should complement each other.</p>	<p>The Report notes that volatility control mechanisms should be just one component of an overall market resiliency framework. Recommendation 1 refers to “appropriate” volatility controls.</p>
	<p><b>(BR)</b> Resumption of trading following a halt need as much consideration as the calculation of volatility control triggers. Trading should resume only when imbalances are relieved and market prices represent equilibrium levels.</p>	<p>We agree that how trading resumes following a halt caused by the triggering of a volatility control mechanism is an important consideration. We have added language in the Report to clarify.</p>
	<p><b>(FIA)</b> Does not believe that derivatives price discovery should be linked to the underlying instrument through the use of theoretical or fair value calculations. The decoupling is an important</p>	<p>The Report referenced the linking of the derivatives price to the price of the underlying product as an example only. We agree this may not be appropriate or desirable in all</p>

	consideration where the derivative may trade on a 24-hour basis.	jurisdictions or trading venues.
	<b>(FIA)</b> Believes that controls should be automated, but trading venues still have discretion to intervene manually when appropriate.	The focus of the Report was on automated volatility controls but acknowledged that manual intervention may be appropriate in some cases.
	<b>(FIA)</b> There should not be a one-size-fits all approach to calibration of volatility mechanisms.	The Report acknowledges that few jurisdictions apply a one-size fits all approach. We generally agree given the varying types of market structures and models. In addition, Recommendation 3 suggests that trading venues should regularly monitor volatility control mechanisms to ensure they continue to work as expected. This would support a trading venue evolving and implementing best practices to achieve the desired outcome
	<b>(DFSA)</b> Control mechanisms should not be seen in isolation and other tools available should also be taken into consideration.	The Report noted that volatility control mechanisms should be just one component of an overall market resiliency framework. Recommendation 1 refers to “appropriate” volatility controls. We believe that the recommendation supports this comment.
	<b>(ICE)</b> Strongly recommend that trading venues have sufficient flexibility to design their volatility control mechanisms.	Recommendation 1 does not preclude a trading venue from having appropriate flexibility in the design of their volatility control mechanisms.
	<b>(NEX)</b> Volatility controls in the bond market would distort market efficiency, impair liquidity, disrupt reference rates, and potentially magnify volatility or market stress.	The scope of the Report did not extend to fixed income. We have clarified this in the Report.
	<b>(WFE)</b> Believes that mechanisms are most effective when the costs and benefits of interventions are carefully analyzed. Efficiency should be regularly examined against their objectives. Trading venues should retain discretion in imposing volatility controls.	The cost, benefit, effect, and efficiency are considerations in the design, calibration and on-going monitoring of volatility control mechanisms. Recommendations 1, 2 and 3 support this comment.
<b>RECOMMENDATION 2 – CALIBRATION OF VOLATILITY CONTROL MECHANISMS</b> Trading venues should ensure that volatility control mechanisms are appropriately	<b>(CME)</b> While volatility controls should mitigate the effects of extreme volatility, they should not be designed to prevent volatility, as this would undermine market efficiency.	The Report confirmed that it is vital that thresholds are appropriately calibrated to ensure that the mechanisms are applied only when necessary and do not interfere during times of normal volatility of a financial

<p>calibrated. To do so, trading venues may consider the following non-exhaustive list of elements:</p> <p>(a) the nature of the financial instrument or underlying asset e.g. a security, ETF or derivative.</p> <p>(b) the liquidity or trading profile of the financial instrument.</p> <p>(c) the volatility profile of the financial instrument or underlying product.</p> <p>(d) the volatility control mechanisms in place for related financial instruments and/or markets.</p> <p>(e) the price of the financial instrument.</p>		instrument.
<p><b>RECOMMENDATION 3 –MONITORING OF VOLATILITY CONTROL MECHANISMS</b></p> <p>Trading venues should regularly monitor volatility control mechanisms to make sure they are working as designed and to identify circumstances that would require the mechanisms to be re-calibrated.</p>	<p><b>(DFS)</b> Suggests that examples or guidance on how a volatility control mechanism should be calibrated (e.g. examples of best practices).</p> <p><b>(FIA)</b> Does not believe there should be a mandate on timeframes for review. Should be determined by the trading venue in consultation with market participants and regulators.</p>	<p>Because of the broad application of volatility control mechanisms across varying market structures and models, prescriptive guidance on specific methodologies is not appropriate. The paper sets out high level objectives and principles.</p> <p>Recommendation 3 does not specify a specific timeframe but rather that monitoring of volatility control mechanisms should be done on a regular basis.</p>
<p><b>RECOMMENDATION 4 – INFORMATION NECESSARY FOR REGULATORY AUTHORITIES TO MONITOR THE VOLATILITY CONTROL MECHANISM FRAMEWORKS</b></p> <p>Regulatory authorities should consider what information they require to effectively monitor the overall volatility control mechanism framework in their jurisdiction, and make sure that trading venues maintain relevant records.</p>	<p><b>(FIA)</b> Believes that trading venues should continue to evolve and implement best practice through thought-leadership. Does not believe that one-size-fits-all approach is appropriate.</p>	<p>The Report acknowledged that few jurisdictions apply a one-size-fits-all approach. This would support a trading venue evolving and implementing best practices to achieve the desired outcome.</p>
<p><b>RECOMMENDATION 5 – INFORMATION REGARDING TRIGGERING OF VOLATILITY CONTROL MECHANISMS TO REGULATORY</b></p>		

<p><b>AUTHORITIES</b> Trading venues should make available upon request by their regulatory authority information about the execution of any volatility control mechanism.</p>		
<p><b>RECOMMENDATION 6 – COMMUNICATION OF INFORMATION ABOUT VOLATILITY CONTROL MECHANISMS TO MARKET PARTICIPANTS AND THE PUBLIC</b> Trading venues should communicate sufficient information to market participants and, if appropriate, the public to understand the nature and operation of the volatility control mechanisms used.</p>	<p><b>(CME)</b> It is important that market infrastructures share accurate information and avoid misleading communications that may contribute to confusion.</p>	<p>We agree that the information shared by trading venues must be accurate and meaningful.</p>
	<p><b>(DSFA)</b> Suggest elaboration around not disclosing specific thresholds to avoid misuse.</p>	<p>The misuse refers to the potential deliberate triggering of a volatility control mechanism to halt trading. We have added an example to the Report.</p>
<p><b>RECOMMENDATION 7 – COMMUNICATION TO MARKET PARTICIPANTS AND THE PUBLIC WHEN A MECHANISM IS TRIGGERED</b> Trading venues should make available to market participants and, if appropriate, the public information regarding the triggering of a volatility control mechanism. Information to market participants should be provided promptly.</p>	<p><b>(FIA)</b> While it is appropriate to communicate market status through private channels, it is also important to provide information through public websites and social media.</p>	<p>Recommendation 7 refers to making appropriate information available but does not suggest delivery channel. We have added language to the Report to include the consideration of delivery channels that may be appropriate.</p>
	<p><b>(WFE)</b> Public communications around the triggering of volatility controls should avoid unintentionally encouraging pro-cyclical behavior.</p>	<p>This would be a consideration when a trading venue determines what communication is appropriate in the context of their market structure and model.</p>
<p><b>RECOMMENDATION 8 – COMMUNICATION BETWEEN TRADING VENUES</b> Where the same or related instruments are traded on multiple trading venues in the same jurisdiction, trading venues should communicate as appropriate when volatility control mechanisms are triggered. Where the same or related instruments are traded in different jurisdictions and the mechanism is</p>	<p><b>(BR)</b> Where the same instrument trades on multiple venues, mechanisms should be harmonized and well publicized for consistent treatment.</p>	<p>Depending on the jurisdiction and market structure, this may be appropriate. Trading venues and regulatory authorities may consider harmonization in the design of a volatility control mechanism. However, in some cases, a volatility event may be local in nature and direct coordination may interfere with normal trading on another trading venue.</p>
	<p><b>(DB)</b> Does not agree with recommendation. Argues cost versus benefit and that a local liquidity imbalance does not have an effect on other trading venues.</p>	<p>Recommendation 8 only suggests that a trading venue should consider communication where appropriate. The degree of communication may</p>

triggered, communication may be appropriate.		vary based on different market structures and models in different jurisdictions.
	<b>(FIA)</b> Notes that a trigger within one market or jurisdiction may be appropriate without needing to stop the price discovery process in another market or jurisdiction.	Recommendation 8 does not suggest a direct linking of volatility control mechanisms, but rather appropriate communication when a volatility control mechanism is triggered.
	<b>(DFSA)</b> Suggest that a recommendation on the regulatory setup for scenarios that involve multiple jurisdictions be included.	The Report was intended to apply broadly across all IOSCO jurisdictions. The actual set up and design considerations will differ across jurisdictions and requires the flexibility to be effective when applied to varying market structures and models.
	<b>(WFE)</b> Communication should be according to a market operator's judgement rather than overly mechanical rules.	The recommendation does not suggest overly mechanical rules but rather a degree of communication that is appropriate.
	<b>(WFE)</b> While it may be appropriate for dual-listed securities and linked securities to be coordinated, the need should be determined by the circumstances.	The recommendation suggests that a trading venue determines what communication is appropriate. Different circumstances may be a consideration when determining the appropriate degree of communication.
<b>Other Comments</b>	<b>(CBOE)</b> Supports the recommendations.	We acknowledge the comment.
	<b>(CME)</b> Support a principles-based approach and that trading venues should have the flexibility to manage volatility controls.	We acknowledge the comment.
	<b>(EU)</b> Is largely complying with the proposed recommendations.	We acknowledge the comment.
	<b>(Nasdaq)</b> Supports the recommendations.	We acknowledge the comment.
	<b>(WFE)</b> Broadly supports the recommendations.	We acknowledge the comment.