

22 April 2016

VIA ONLINE SUBMISSION (<http://regulations.gov>)

Office of the Under Secretary for Domestic Finance
U.S. Department of the Treasury
1500 Pennsylvania Avenue, NW
Washington, DC 20220

Re: **Request for Information on Evolving Treasury Market Structure**
(Docket No. TREAS-DO-2015-0013)

Dear Sir or Madam:

CME Group Inc. ("**CME Group**") appreciates the opportunity to provide comments to the Office of the Under Secretary for Domestic Finance of the Department of the Treasury ("**Treasury**") in response to its "Notice Seeking Public Comment on the Evolution of the Treasury Market Structure" ("**RFI**"). The RFI poses specific questions in furtherance of several recommendations for next steps set out in the "Joint Staff Report: The U.S. Treasury Market on October 15, 2014" ("**Joint Report**") issued on July 13, 2015 by the staffs of the Treasury, Board of Governors of the Federal Reserve System ("**Board**"), Federal Reserve Bank of New York ("**FRBNY**"), Securities and Exchange Commission ("**SEC**") and Commodity Futures Trading Commission ("**CFTC**"). (Collectively, we refer to the Treasury, Board, FRBNY, SEC and CFTC, as the "**Regulators**.") The Joint Report presented the preliminary analysis and findings by the joint staffs to try to determine the causes of a sharp 12 minute volatility event that occurred in the cash Treasury securities markets and certain related futures markets on October 15, 2014.

I. **BACKGROUND ON CME GROUP**

CME Group is the parent of four U.S. based futures exchanges that are registered under the Commodity Exchange Act ("**CEA**") with the CFTC as designated contract markets ("**DCMs**"): Chicago Mercantile Exchange ("**CME**"), the Board of Trade of the City of Chicago, Inc. ("**CBOT**"), New York Mercantile Exchange, Inc. and Commodity Exchange, Inc. (collectively, the "**CME Group Exchanges**" or "**Exchanges**"). The CME Group Exchanges list a range of products for trading across all major asset classes, including futures and options on futures (collectively, "**futures**") based on interest rates, equity indexes, foreign exchange, and energy, metals and agricultural commodities. Relevant for purposes of the RFI, CBOT lists futures on Treasury securities covering a broad set of maturities, including the benchmark 10-Year Treasury Note futures, and CME lists a range of related interest rate futures, including a USD denominated contract that settles against the 3-month LIBOR rate.

The CME Group Exchanges attract a broad base of global customers, which trade our listed products to meet their hedging, risk management or other trading needs. We facilitate competitive, centralized auction market trading through the CME Globex[®] electronic trading platform and, for certain options on futures, our open outcry trading facilities in New York and Chicago. We also permit certain types of privately negotiated transactions in our listed futures, subject to our rules.

CME operates CME Clearing, which is a CFTC-registered and regulated derivatives clearing organization (“**DCO**”) that provides clearing and settlement services for transactions in the products listed for trading on the CME Group Exchanges, as well as for certain “cleared only” over-the-counter (“**OTC**”) derivatives (i.e., swaps) transactions. CME Clearing is integral to maintaining the financial integrity of transactions in our markets.

CME Group is committed to protecting the market integrity of *all* products that we offer for trading, including the Treasury and interest rate futures offered on the CBOT and CME that were analyzed in the Joint Report. It is essential to our business that market participants trust our markets to be fair, competitive, efficient, transparent, liquid, dynamic and conducted in accordance with the highest possible standards.

The CME Group Exchanges, as DCMs, are self-regulatory organizations, with established rules governing trading in our markets combined with extensive programs operated by CME Group for monitoring and enforcing market participants’ compliance with those rules. In short, we are the front line for policing and ensuring the integrity of the markets we offer for trading. We operate under the comprehensive, robust regulatory framework established by the CEA, subject to CFTC rules and oversight, and are held to statutory core principles, all of which further promote the integrity of our markets as a matter of federal public policy.

II. **GENERAL COMMENTS**

Our general comments on the RFI are presented below. We provide more detailed responses to certain of the specific questions in the RFI in Appendix A, attached. We have also attached other documents as appendices, which elaborate upon certain of our general comments.

A. General Observations on the Scope and Purpose of the RFI and Next Steps

CME Group appreciates the interest on the part of the Regulators, and in particular Treasury, to investigate and understand the causes of the volatility event that occurred on October 15, 2014. Seemingly erratic events such as that could impair public confidence in the operation of the cash Treasury markets. It is important, though, to keep the volatility event in perspective and to avoid regulatory overreaction. Notably, the Treasury securities markets and Treasury futures markets continued to function during the volatility event. Insofar as the event appears not to have precipitated any institutional defaults, it left financial markets essentially undisrupted. Although the Treasury markets experienced a sharp decline and rise in prices during a narrow time window, the markets absorbed those price swings. (We use the term Treasury markets to refer to the interrelated cash markets for Treasury securities and Treasury futures markets.) We also note that such volatility events have been rare in the Treasury markets.

Nonetheless, we agree that this is an appropriate time for the Regulators to evaluate how the Treasury markets have evolved, and whether it may be appropriate to adopt regulatory measures to protect the integrity of those markets. It is not necessary, though, to impose additional requirements in the areas contemplated in the RFI – risk controls, market data collection or enhanced market surveillance – on the futures markets where comprehensive, effective regulatory requirements and infrastructure are already in place.

The Joint Report identifies certain factors shaping the evolution of the Treasury markets, notably the growing “electronification” of trading and increased participation by principal trading firms (“**PTFs**”) engaged in automated trading in the cash Treasury securities markets. We believe that electronic trading in the cash Treasury markets can be a beneficial development for those markets. Electronic trading has in recent years become the predominant execution method for the futures markets generally, and the

Treasury futures markets more specifically. Indeed, CME Group has adopted innovative and robust controls to protect our markets against the potential disruptive effects that automated trading can have. Electronic trading has provided significant public benefits to our futures markets, including increasing liquidity, promoting price discovery, narrowing bid-ask spreads, and lowering risk management costs. Electronic trading also enhances the capture of detailed and reliable audit trail data, which is an important component of our trade and market surveillance programs. Such data also enhance the compliance efforts of the CFTC.

While electronic trading is undoubtedly having a transformative effect, we question the almost exclusive focus on electronic trading by PTFs as *the* factor reshaping the cash Treasury markets. If the objective is to undertake a comprehensive study, the Regulators should expand the scope of their study to consider whether other factors are having a material impact on Treasury market evolution, such as regulatory capital requirements for banking organizations, and the potential implications of any such factors for market structure and liquidity. A comprehensive study also should consider whether currently sanctioned but potentially disruptive conduct, such as settlement fails, is exerting negative impact on the operation of the Treasury securities markets.

We commend the Regulators for working together on the initial analysis resulting in the Joint Report. Given the distinct nature of regulation that applies to the cash Treasury securities markets, and the separate regulatory framework for the Treasury futures markets, it is important for the Regulators to continue working together as they pursue the next steps identified in the Joint Report and, in particular, as they consider ways to strengthen monitoring and surveillance and to promote interagency coordination related to trading across the Treasury markets.¹ Interagency coordination is critical to assure that any future regulatory actions are consistent with the differing statutory frameworks governing trading in the Treasury securities and Treasury futures markets and with each Regulator's statutory authority, and to avoid imposition of duplicative and potentially counterproductive regulatory obligations on markets and market participants.

In regard to the latter, as Treasury is likely aware, the CFTC has initiated a rulemaking, referred to as Regulation AT (for automated trading) ("**Proposed Regulation AT**").² In this pending rulemaking, the CFTC is addressing certain of the same considerations raised in the RFI, such as whether to require registration of PTFs (or other market participants) engaged in automated trading (referred to as "AT Persons" in Proposed Regulation AT) or to impose standards with respect to certain pre-trade and other risk controls on algorithmic trading. The CFTC is proposing a comprehensive set of rules in these areas and others, which the CFTC believes largely codify what it has identified as industry best practices adopted by futures exchanges, futures commission merchants ("**FCMs**") (which are CFTC-regulated industry professionals that are authorized to execute and clear futures trades for customers), and PTFs. The CFTC's proposal raises a number of issues for the futures industry, as set out in the numerous comment letters that the CFTC has received. While CME Group has significant concerns with elements of the CFTC's Proposed Regulation AT, which we discuss at length in our March 16, 2016, comment letter to the CFTC ("**CME Group Proposed Regulation AT Comment Letter**"), we share the CFTC's goal of attempting to reduce risks to market integrity from automated, algorithmic trading.

The regulatory measures contemplated in the RFI, as they could pertain to the Treasury futures markets, are best resolved between the CFTC, as the Regulator designated with responsibility for

¹ The Joint Report identified next steps in the following four areas: (i) further study of the evolution of the U.S. Treasury market and implications for market structure and liquidity; (ii) continued monitoring of trading/risk management practices across U.S. Treasury markets and review of current regulatory requirements; (iii) assessment of data available on U.S. Treasury cash securities markets to public and official sectors; and (iv) continued efforts to strengthen monitoring and surveillance and promote interagency coordination related to trading across the U.S. Treasury market. The RFI relates to the first three.

² CFTC, *Regulation Automated Trading; Proposed Rule*, 80 FR 78824 (Dec. 17, 2015).

regulating the U.S. futures markets, and futures exchanges, industry professionals and other market participants subject to the CFTC's oversight, through the public comment process for Proposed Regulation AT. Notwithstanding, CME Group strongly supports the proposition that market participants should be given the flexibility to establish and effectively implement pre- and post-trade risk management controls and supervisory procedures that are appropriate to the nature of their business and trading strategies. Many PTFs that trade our Treasury futures products also trade a broad range of futures, as diverse as futures on energy commodities or metals or foreign currencies or stock indexes. It would be highly disruptive to such established infrastructure, as well as costly and unnecessary, to impose additional risk control requirements by regulatory fiat that single out Treasury futures for special treatment different to other segments of the futures markets.

Finally, we encourage the Regulators to review the current regulatory requirements that apply to the Treasury markets and market participants, to identify any statutory provisions or agency rules that may pose obstacles to the future beneficial evolution of those markets (e.g., statutory or regulatory impediments to trading combinations of Treasury futures and Treasury securities, in single transactions as basis spreads, on organized exchange markets).

B. Treasury Futures Markets Are Not the Same As Treasury Securities Markets

There are compelling reasons for the Treasury futures markets to be regulated under the CEA framework, and not under the Government Securities Act governing the secondary markets for Treasury securities (or other federal securities laws). A transaction in a particular Treasury futures contract is not a transaction for the purchase or sale of a security. Treasury futures, like all other DCM-listed futures, are derivatives, which our market participants trade for hedging or risk management, or for acquiring price exposure to the instrument itself as a surrogate for investing in the underlying asset. Although CBOT 10-Year Treasury Note futures (and other CBOT Treasury futures) require delivery of the underlying Treasury securities if a market participant holds its position in a contract to expiration, the vast majority of Treasury futures positions are liquidated prior to expiration.³ Because centralized exchange markets for futures also serve a price discovery function by transparently centralizing competitive trading interest, those prices are often relied upon by domestic and global businesses as pricing references in their commercial or business transactions.

Congress has determined that the hedging and price discovery functions of futures markets are in the public interest, and those determinations serve as the policy justification for federal regulation of U.S. futures markets under the CEA framework. Congress has established a regulatory regime for the U.S. futures markets that differs in significant respects from federal regulation of the securities markets, including regulation of the secondary cash markets for Treasury securities under the Government Securities Act. Most notably, all futures contracts, including Treasury futures, must be traded on (or subject to the rules of) a CFTC-regulated futures exchange, to assure that trading occurs in competitive, centralized auction markets, subject to trade practice requirements⁴, exchange controls, and compliance programs designed to further assure integrity of execution in those markets.

³ Over the last quarter century (1991-2015) the share of mature open interest in Treasury futures that went to physical delivery averaged around 2.8 percent, trending more or less steadily downward, from an average of 5.5 percent during 1991-95 to an average of just one percent during 2011-15. (As used here, "mature open interest" in an expiring contract is defined to be the median daily level of contract open interest during the 42 business days ending on, and including, the First Position Day in the contract's delivery cycle.)

⁴ Each of the CME Group Exchanges has trade practice rules requiring competitive trading on the centralized auction markets, and prohibiting wash trading or disruptive trading practices in those markets.

Congress took a much different approach when establishing the market structure parameters for the securities markets, including the markets for Treasury securities.⁵ As explained in the RFI, Treasury securities may be traded in a variety of ways and on a variety of trading venues. Although Treasury securities could conceivably be traded on an SEC-regulated national securities exchange, that model does not currently exist. The norm is for operators of centralized trading platforms for Treasury securities to rely upon the exemption from registration as a national securities exchange available under SEC Regulation ATS.⁶ We recognize that the market structure flexibility that Congress has provided has served the Treasury securities markets well, and is appropriate for transactions involving the actual purchase or sale of securities. As noted in the Joint Staff Report and RFI, the secondary cash markets for Treasury securities are some of the most liquid financial markets in the world.

The futures markets are, of course, interrelated to the underlying cash markets on which they are based. That holds as true for Treasury futures as it does for futures on other underlying interests such as agricultural commodities or energy commodities. Because of the derivative nature of futures, and their potential impact on the related cash markets, the CME Group Exchanges, as DCMs, are required to design their listed contracts such that they are not readily susceptible to manipulation, in compliance with DCM Core Principle 3.⁷ The CFTC sets forth detailed standards in Appendix C to its Part 38 Regulations that a DCM must follow in developing the terms and conditions for a specific futures contract, to assure it is not readily susceptible to manipulation, with standards for both physical-delivery and cash-settled contract designs. As required under those standards, and as a matter of sound business in how we operate our markets, we develop a thorough understanding of the cash markets underlying each and every futures contract we offer, and we are careful to design contracts to minimize the risk that trading in our markets could disrupt trading in the related cash markets. It is also critical for us to have that knowledge for us to operate our highly effective market surveillance programs.

Our deep understanding of how our contracts interrelate to the underlying cash markets, combined with our established market and self-regulatory infrastructure, allows us to adapt promptly and effectively to market changes through implementation of appropriate and enhanced regulatory measures and controls through continual review of such solutions. For example, in response to the liquidity event that occurred on October 15, 2014, CME Group implemented new special price fluctuation limits for CBOT Treasury futures products in December 2014.⁸

C. Liquidity

Liquidity often means different things to different persons, as evidenced by Treasury's questions on how to define liquidity in the RFI. As explained more fully in our responses in Appendix A, there are different ways to measure liquidity such as average daily trading volume or, for futures markets, open interest, and different dimensions for measuring the quality of that liquidity, including depth and resilience, financial cost for completing the transaction (i.e., "tightness"), the breadth or consistency of liquidity distribution, and time to complete a transaction (i.e., "immediacy").

⁵ There are also differences in federal regulation of Treasury securities markets compared to other securities. Congress has deliberately taken a much more light-touch approach towards oversight of Treasury securities markets compared to equity securities; notably, it has not mandated any type of national market system structure for Treasuries as it has for equities.

⁶ 17 CFR §§ 242.300-242.302.

⁷ CEA § 5(d)(3), 7 USC § 7(d)(3).

⁸ See "CFTC Regulation 40.6(a) Certification. Notification Regarding Implementation of New CBOT Rule 589 ("Special Price Fluctuation Limits") for Certain Interest Rate Futures and Option Contracts", CBOT Submission No 14-532 to CFTC, 5 December 2014, available at: <http://www.cmegroup.com/market-regulation/files/14-532.pdf>

We agree with the statements in the Joint Report and RFI describing the secondary cash markets for Treasury securities to be among the most liquid financial markets in the world, by many measures. That liquidity is why Treasury securities are considered safe instruments in which DCOs, such as CME Clearing, and FCMs may invest futures customer cash collateral that they hold. As a DCO, CME Clearing also accepts certain Treasury securities as a form of initial margin or guarantee fund deposits from clearing members, with the confidence that they are highly liquid, safe investment instruments.

CBOT Treasury futures are highly liquid, by many measures. Indeed, liquidity has grown significantly in recent years, as illustrated by the analysis in our responses in Appendix A. We also note that financial industry observers, including the authors of the Analyst Report cited above, have found that CBOT Treasury futures have increasingly become more liquid and actively traded than their cash market counterparts.

We caution against interpreting the volatility event that occurred on October 15, 2014, as a *priori* evidence that the Treasury markets are facing significant liquidity problems. In fact, as a general matter, we have found that a negative relationship exists between Treasury futures price volatility and the depth and scale of the futures order book. Our analysis is set forth in Appendix B, attached. Thus, we question the implication in the RFI that liquidity is an absolute protection against extreme price volatility. Although liquidity may help dampen price swings at the extremes, prices can and from time to time do sharply fall and rise (or rise and fall) even in highly liquid markets.

D. CME Group Risk Systems and Controls

CME Group devotes substantial human resources and technological capabilities to continually develop, implement and enhance risk controls and system safeguards to mitigate the risks that trading, whether automated or manual, could pose to our markets, and has done so for many years. We have worked closely with clearing members, industry organizations and other market participants to build a resilient, workable and cost-effective set of controls and systems to achieve the shared goal of protecting market integrity. We view these efforts as a business imperative; we did not have to be told by government mandate to take these measures.

The risk management tools we employ for electronic trading on our Globex electronic trading platform include, but are not limited to:

- price banding;
- protection points for market and stop orders;
- maximum order size protection;
- stop logic functionality;
- velocity logic functionality;
- Globex credit controls;
- risk management interface;
- kill switch;
- market performance protection;
- market maker protections;
- cancel on disconnect protection; and
- self-match prevention.

These tools are supplemented by risk management services, risk protection policies and rules (including a rule in place at each CME Group Exchange requiring clearing members to have written risk

management policies and procedures to ensure they are able to perform their basic risk and operational functions at all times), which are administered by the CME Group Global Command Center and Clearing Risk Management Department, and for which market surveillance, investigation, and enforcement are performed by the CME Group Market Regulation Department.

Please refer to Appendix C, attached, for a fuller description of the exchange's kit of risk management and volatility mitigation tools.

In addition, to assure optimal performance of our Globex electronic trading platform, our Globex Support Administration ("**GSA**") Department measures client messaging activity and its impact on components of the electronic trading infrastructure. GSA staff investigate and address alerts related to excessive transactions per second, anomalous latencies at the engine level, excessive log-on attempts, malformed FIX messages, cancel on disconnect events and excessive rejected orders. The same team also leads comprehensive performance testing of changes introduced to the Globex system infrastructure to ensure the reliability of the CME Globex platform.

E. Self-Trade (Self-Match) Prevention

The RFI asks whether self-trading should be expressly prohibited in the cash Treasury markets, or whether self-trading provides any benefits to the markets. CME Group urges caution against imposing any outright prohibition against all self-trading. A more nuanced approach is appropriate.

For example, in the futures markets, the CME Group Exchanges and the CFTC have long banned market participants from knowingly self-trading to avoid taking *bona fide* market positions exposed to market risk, generally known as "wash sales." These types of intentional self-match transactions give the marketplace the misimpression of genuine buying and selling interest at a particular price and thus erode the integrity of the marketplace and distort the price discovery process. However, there are instances wherein buy and sell orders are unintentionally matched for accounts with common beneficial ownership, but where such buy and sell orders have been independently initiated, for legitimate purposes that represent bona fide buying and selling interest. These instances have been recognized by the CFTC in its Proposed Regulation AT as being legitimate occurrences of self-matching that contribute to the price discovery process. We believe that removing legitimate and *bona fide* self-match trades – where market participants have in place independence of traders/trading groups/algorithms – will only degrade the price discovery process. These regulatory determinations, which we have made in the best interests of our markets, are set forth in Rule 534 in the Rulebook of each of the CME Group Exchanges, and in CME Group Market Regulation Advisory Notice Number RA 1411-5RR (2 January 2015).

CME Group began offering Self-Match Prevention ("**SMP**") functionality in June 2013 to our customers, including PTFs, as a tool they could voluntarily use. We continually look to enhance the SMP functionality to provide our customers the greatest level of flexibility in choosing to implement it on their own accord and without mandate. We are pleased that Treasury is not suggesting in the RFI the need for the Regulators to impose an outright ban (or other additional restrictions on self-trading) in the futures markets. Such action is unnecessary in light of the protections and controls already in place.

The protections and controls we have implemented have proven highly successful. The incidence of potentially impermissible self-trading in our Treasury futures markets is a negligible share of daily trading volume (by one large-sample estimate from early 2015, a small fraction of one percent).⁹

⁹ CME Group recently conducted an analysis of self-trading that would have been considered impermissible under a proposed CFTC rule banning self-trading subject to a limited exception for matching buy and sell orders initiated for the same beneficial owner by independent account controllers. That analysis revealed that the impermissible activity under the proposed rule is negligible. Please refer to the CME Group Proposed Regulation AT Comment Letter at pages 27 through 34 for a detailed explanation of the analysis.

The experience of October 15, 2014, exemplifies the point. The Joint Report cites that during that day's event window (09:33 – 09:45 EST) approximately 11.5% of trading volume in CBOT 10-Year Treasury Note futures resulted from self-trades. What the Joint Report fails to mention is that 98.9% of such self-trades occurred at firms that utilized SMP. Because PTFs commonly deploy SMP to prevent self-trading within trading teams, but not between independent trading teams, self-trading occurs not infrequently even when firms deploy SMP. Consistent with this general observation, our analysis of the event window finds that just 0.1% of such self-trades involved the same trader and same account on opposing sides of a transaction, and that just 0.5% of such self-trades involved the same account but different traders at the firm. The remaining 99.4% of such self-trades matched different accounts and different traders at the same firm. (The Joint Report itself recognizes that it would be reasonable to expect such an outcome in any market where it is not uncommon for a representative PTF to run multiple independent trading algorithms simultaneously.) With this evidence in mind, we abide in our view that the best solution with respect to self-trades is the solution that now prevails, in which the trading venue or exchange conducts market surveillance to detect instances of potentially impermissible self-trading.

Accordingly, we recommend against adopting any outright ban on self-trading for the cash Treasury markets. If any of the Regulators responsible for oversight of the Treasury securities markets ultimately determine that some restrictions on self-trading should be imposed in those markets, we recommend as an alternative imposing requirements that PTFs use self-match prevention functionality when trading on electronic platforms, but that PTFs should be given the flexibility to implement their own controls or to use any self-match prevention tools offered by the trading platform. The appropriate Regulator should also recognize buy and sell orders which have been independently initiated for the same beneficial owner as generally being legitimate transactions.

F. Futures Market Data Available To the Official Sector

The RFI requests comment on the most efficient and effective way to collect, aggregate and appropriately monitor U.S. Treasury cash and futures market data, including whether additional infrastructure is necessary for market participants to begin reporting comprehensive U.S. Treasury market transaction data to the official sector. In addition, the RFI calls for comment on the optimal level and form of data that should be made available to the public.

As acknowledged in the RFI, the futures markets have a robust electronic audit trail. Indeed, the next-step recommendation to assess the data available to the official and public sectors is specific limited to data pertaining to the *cash* Treasury markets. Thus, we are puzzled why questions in the RFI are framed to suggest the need to enhance data collection for the Treasury futures markets. The concerns implicit in those questions do not apply to futures markets.

The CME Group Exchanges capture detailed transaction data for all our markets, including those for Treasury futures, and we provide that data on a daily basis to the CFTC. This detailed audit trail data is an integral part of our market surveillance and trade practice surveillance programs, and also facilitates the CFTC's compliance efforts. Moreover, the CFTC has the authority to provide that data to other federal agencies in connection with their regulatory functions.¹⁰

Given that the U.S. futures markets have already developed efficient and effective data infrastructures that are available to the official sector, and have also built comprehensive and highly transparent public-facing data capabilities, it seems premature to contemplate adding an overlay of new data collection infrastructure at this time. If and when the cash markets develop similar capabilities, and comparable data sets exist, the Regulators could then turn their efforts to analyzing how to link them.

¹⁰ CEA §§ 2(a)(11), 8(a)(5), and 8(e), and 17 CFR § 140.73

Effective coordination across the relevant Regulators is the only viable means to achieve the intended result. There is no basis to justify the massive costs involved with building an omnibus trade data repository.

As highlighted above, one premise of the RFI is that there is a lack of consistently reliable data available to responsible agencies across all segments of the Treasury market structure. Although there may be data quality problems in some segments of the Treasury securities markets, they do not exist in the Treasury futures markets.

As DCMs, the CME Group Exchanges are required to maintain an audit trail for every order passing through and every transaction matched on our trading platforms, whether on Globex or in our open outcry markets for certain options on futures contracts. We have made considerable investments in our regulatory and market supervision infrastructure to meet our audit trail obligations.

The Globex electronic trading platform, on which almost all trading in CBOT Treasury futures contracts occurs, allows us to capture audit trail data on a real-time basis at a granular level, including all elements of messages, transactions and market data quotations. At minimum, this information is time stamped at the millisecond level, with some systems capturing sub-millisecond time stamps. With respect to order messages, our audit trail allows immediate, as well as historical, access to every order, modification, and cancellation, and every market data message and change in the state of the central limit order book.

With respect to transaction detail, our systems infrastructure and applications are able to capture, among other data elements, the order instructions, account number, a unique identifier of the user who entered the order and whether the order was entered by a user employing an automated trading system. This data includes identifying elements such as the executing firm, user ID and account number for each trade.

The audit trail data described above is supplemented by large trader data collected by the DCMs and CFTC under their large trader reporting programs. The data identifies persons holding large positions in specific futures contracts at or above prescribed reportable levels. The CFTC has recently expanded its large trader reporting program to also collect on a routine basis data on large volume traders in a particular futures contract. The CFTC and futures exchanges also have the authority to request large position traders and large volume traders to provide them with more detailed information regarding the trader's activity and intentions in the market.

The futures audit trail and large trader data available to CME Group and the CFTC allow for effective monitoring of trading activity in all our futures contracts, including Treasury futures, at both the exchange and government levels. CME Group has developed its own robust suite of internal tools that allow our Market Regulation Department to deeply analyze our trade data effectively and with exceptional speed. Due to these audit trail capabilities, we have been able to develop increasingly sophisticated regulatory surveillance capabilities. We use these tools and systems to profile markets and participants, to review and analyze participants' order activity, trading and positions, generate live position and volume alerts based on absolute levels or on anomalous activity relative to historical profiles, and to identify transaction patterns and anomalies that may be indicative of misconduct.

Because our systems contain detailed order and transaction data, quote data and also profile statistics of markets and market participants, we have been able to develop analytical tools and a full suite of pattern detection capabilities (integrated with the market and participant profiles) that allow our analysts to set variable parameters and establish differential priority rankings for specific pattern elements.

In addition, we have leveraged our data infrastructures to enhance the risk management and risk control frameworks that apply to our electronic markets. Notably, our Global Command Center (“GCC”) performs continuous market surveillance using our audit trail records. Dedicated staff monitor the markets in real-time, examining the origin and/or market impact of various anomalies such as volume or price spikes, stop logic events, unusual messaging, technical issues, and/or orders that are rejected by the matching engine for exceeding price banding or maximum order size parameters. The objective of this monitoring is to mitigate risks to the proper functioning of the market. GCC staff refer potential regulatory issues to the Market Regulation Department for investigation of potential rule violations.

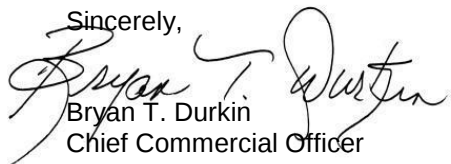
CME Group believes that strong data infrastructure capabilities are essential to promoting fair and orderly markets, free from manipulative, fraudulent or disruptive activity. It is therefore imperative that regulators have the granular audit trail and reference data, as well as the technological tools and expertise, to effectively monitor trading in the type of high speed and high messaging trading environment that exists today.

Our comprehensive audit trail data, market data capabilities and robust technology infrastructures and tools are essential parts of performing our regulatory responsibilities effectively and efficiently in today’s highly data intensive markets. Worthy of Treasury’s consideration is whether other centralized markets operating in today’s highly data intensive environment should be responsible to make commensurate investments in appropriate risk management infrastructure.

G. Futures Market Data Available to the Public

CME Group provides comprehensive market data to the public. Individuals and firms are able to access real-time, delayed, and end-of-day data for all CME Group markets. More than 200 vendors are authorized to distribute real-time, delayed, and end of day quotation, trade, and market summary data for CME futures and options markets indirectly to the public. CME Group also directly provides daily and historical settlement data for volume, open, close, high, and low prices for all of our product offerings. These reports summarize, among other things, exchange-wide volume for Globex, Clearport/PNT and open outcry across all divisions and asset classes. Firms may also choose to access market data directly via CME Group’s Market Data Platform (“MDP”), which allows highly-efficient message delivery and is designed for scalability and flexible customer redistribution of market data messages.

CME Group appreciates the opportunity to provide our comments to Treasury on the RFI. We are happy to answer any questions that Treasury, the other Regulators or their respective staffs may have on any of our comments. Please do not hesitate to contact me at (312) 435-3687 or via email at bryan.durkin@cmegroup.com.

Sincerely,

 Bryan T. Durkin
 Chief Commercial Officer

APPENDIX A

CME GROUP RESPONSES TO APPLICABLE QUESTIONS IN THE RFI

1.1

Have there been changes in the nature of liquidity provision, or demand for liquidity, in the U.S. Treasury market? If so, are these trends different in the futures, dealer-to-customer, or interdealer broker (“IDB”) market, or in the “on-the-run” and “off-the-run” sectors, or across different types of Treasury securities (e.g. bills, nominal fixed rate coupon securities, nominal floating rate securities, and inflation-indexed securities)? Which factors have been responsible for any observed trends in liquidity provision and/or demand? In addressing those questions, please consider the dealer-to-customer market, trading on IDB platforms, and in the futures market, as applicable, and please provide or refer to data and/or analysis that support your conclusion. In addition, please consider the following questions, as applicable:

- How do you define liquidity? How do you define liquidity provision?*
- Which measures are most indicative of the degree of liquidity? How might these measures be refined or expanded, if you were not limited by the availability of data?*
- How do different indicators provide information on different aspects of liquidity, and in what ways?*
- Which measures best represent the resilience of liquidity, or the relationships between liquidity and volatility?*
- To what extent are these measures of liquidity and the resilience of liquidity different from measures used in other markets that have witnessed similar market structure changes? What are the idiosyncratic factors unique to Treasury cash markets that may cause these measures to differ?*
- What changes, if any, have you observed in these measures over recent years? Over recent months?*
- What microstructure features of the U.S. Treasury futures and cash markets, including both IDB venues and dealer-to-client markets, have affected the functioning, liquidity, efficiency and participation in these markets? What features have affected the functioning of the Treasury market as a whole?*

Market liquidity is many-faceted. It often means different things to different observers. Diverse measures are used to gauge it (Exhibit A2). On the evidence of the most familiar of these, liquidity in CBOT Treasury Note and Bond futures (Exhibit A1) has improved markedly in recent years.

Exhibit A2 -- CBOT Treasury Note and Bond Futures Contract Features

Futures Contract	Contract Code	Contract Notional Size (Face Value of Deliverable Grade, \$)	Value of Contract Price Point (\$ at Par = 100 Points)	Deliverable Grade
Long-Term Bond	UB	100,000	1,000	Treasury bonds. Remaining term to maturity: at least 25 yrs.
Bond	US	100,000	1,000	Treasury bonds. Remaining term to maturity: at least 15 yrs and less than 25 yrs.
10-Year Note	TN	100,000	1,000	Treasury notes. Remaining term to maturity: at least 9 yrs 5 mos and not more than 10 yrs.
Long-Term Note (6 ½ to 10-Year)	TY	100,000	1,000	Treasury notes. Remaining term to maturity: at least 6 yrs 6 mos and not more than 10 yrs.
Intermediate-Term Note (5-Year)	FV	100,000	1,000	Treasury notes. Original term to maturity: not more than 5 yrs 3 mos. Remaining term to maturity: at least 4 years 2 mos.
Short-Term Note (2-Year)	TU	200,000	2,000	Treasury notes. Original term to maturity: not more than 5 yrs 3 mos. Remaining term to maturity: at least 1 yr 9 mos and not more than 2 yrs.

Source: CME Group

Exhibit A1 – Dimensions of Liquidity

	Description	Measures
Depth and resilience	A market typically is deep when there are large and frequent flows of both buy orders and sell orders. Under such conditions, trading volumes should be relatively high, and price impacts of larger transactions should be relatively low, conducing to lower market microstructural volatility and greater market resilience. Depth measures comprise both aggregate trading volumes, and turnover-based measures, including volumes traded per security or per contract.	Trading volumes. Scale of futures open interest. Scale of dealers' securities inventories. Price impact of volume measures. Turnover ratios. Intra-day volatility. Scale of resting orders at best bid and best ask price levels (for central limit order book markets).
Tightness	Tightness typically refers to the financial cost of completing a transaction.	Bid-ask spreads
Breadth	Breadth typically refers to the consistency with which liquidity is distributed within asset classes and to the differences in liquidity characteristics across markets. Breadth is reflected in the number and diversity of market participants, and by segregation of assets into different liquidity strata (eg, on-the-run versus off-the-run Treasury CUSIPs).	Distribution of liquidity (eg, share of trade volume accounted for by the most liquid Treasury CUSIPs). On/off-the-run bid-ask spreads.
Immediacy	Immediacy typically refers to the time it takes to complete a transaction. Market makers are a frequently used source of immediacy.	Number of market makers. Number of market participants. Availability of quotes. Frequency distribution of trades. Frequency distribution of trade sizes. Number of 'zero-trading days.'

Adapted from: PWC, *Global financial markets liquidity study*, Table 2.1, pg 19, PriceWaterhouseCoopers LLP, 2015, which is available at <http://www.pwc.com/gx/en/financial-services/publications/assets/global-financial-market-liquidity-study.pdf>

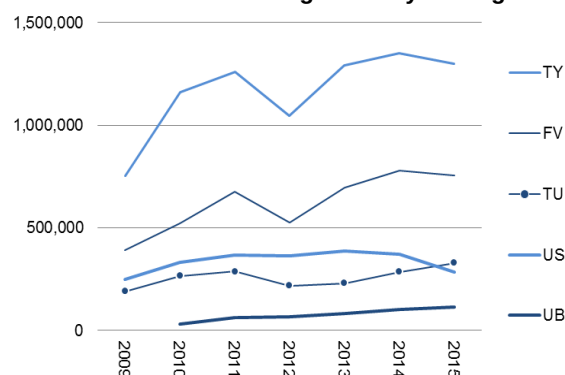
Perhaps most familiar is **trading volume**. Given the standardization that generally characterizes listed futures contracts, moreover, a useful, familiar, and equally informative complement is **open interest**. By either yardstick, the Treasury futures liquidity pool (Exhibits A3, A4, and A5) has deepened and grown more resilient in recent years. Between 2010 and 2015, cumulative growth of annual average daily trading volume (ADV) ranged from 11 percent for Bond (US) futures and Long-Term "Ultra" Bond (UB) futures combined, to 44 percent for Intermediate-Term (5-Year) Note (FV) futures. At the same time, cumulative growth in annual average daily open interest (ADOI) achieved double digits in all Treasury futures products other than FV, for which it skyrocketed more than 120 percent.

Exhibit A3

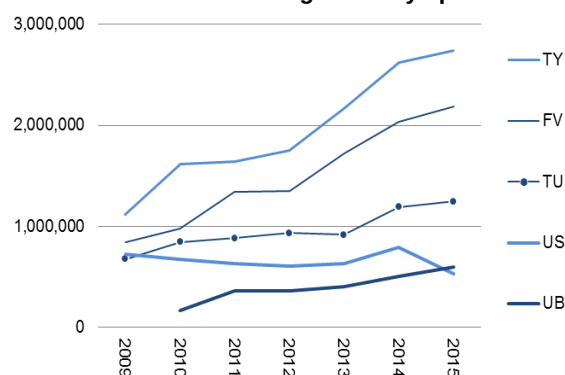
Treasury Note and Bond futures: Cumulative growth of annual average daily volume (ADV), annual average daily open interest (ADOI), and annual average best bid and best offered quantities (ADBBO), 2010 to 2015 (pct)

	ADV	ADOI	ADBBO
UB			73
US	11	34	-47
TY	12	70	19
FV	44	123	30
TU	24	48	35

Source: CME Group

Exhibit A4 -- Annual average of daily trading volume in Treasury Note and Bond futures (contracts/day)

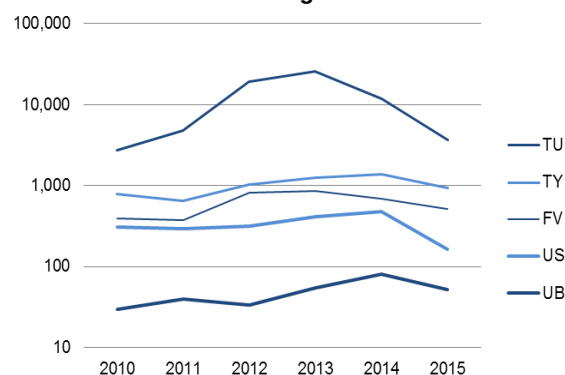
Source: CME Group

Exhibit A5 -- Annual average of daily open interest in Treasury Note and Bond futures (contracts)

Source: CME Group

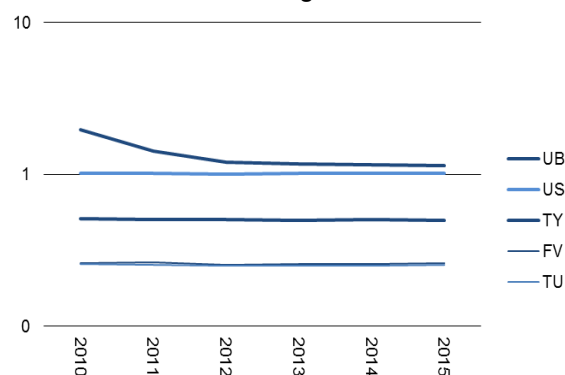
Given that Treasury futures are traded in competitive, transparent, organized, and centralized limit order book (CLOB) markets, another informative gauge is market depth – here, the average **scale of resting buy and sell orders** quoted at, respectively, best bid and best offered price levels. Between 2010 and 2015, this measure posted positive growth in all Treasury futures products excluding US futures, with cumulative gains ranging from 19 percent for Long-Term (6 ½ to 10-Year) Note (TY) futures to 73 percent for UB futures (Exhibit A6).

Exhibit A6 dramatizes that market depth – whether at the best bid and offered price levels, or at best multiple bid and offered price levels -- tends to be negatively correlated with market price volatility. That is, when volatility is relatively low (as in, eg, 2012-14) price makers are emboldened to quote larger resting bid or offered amounts. When price volatility is relatively high (as in, eg, 2010 or 2015), price makers are apt to take a more conservative approach to quoting quantities for purchase or sale. (For further evidence on this point, please see Appendix B.)

Exhibit A6 -- Annual average best-bid/best-offered quantities (number of contracts, natural log scale)

Source: CME Group

Because Treasury futures contracts are standardized in terms of their minimum allowable price increments, and given that the spread between a contract's best bid and best offered prices tends to gravitate to the contract's minimum price increment, it comes as no surprise that the average **best-bid/best-offered price spread** shows almost no variation (Exhibit A7). Throughout the last six years, accordingly, this measure has held steady at $\frac{1}{4}$ of $\frac{1}{32}^{\text{nd}}$ of a price point for each of Short-Term (2-Year) Note (TU) futures and FV futures, $\frac{1}{2}$ of $\frac{1}{32}^{\text{nd}}$ of a price point for TY futures, and $\frac{1}{32}^{\text{nd}}$ of a price point for US futures. A telling exception is UB futures, which were introduced in January 2010. As the market in UB futures has matured, the average best bid/offer price spread has steadily converged toward the contract minimum price increment of $\frac{1}{32}^{\text{nd}}$ of a price point, narrowing from an average of $\frac{2}{32}^{\text{nds}}$ in 2010 to an average of $1.14/32^{\text{nds}}$ in 2015.

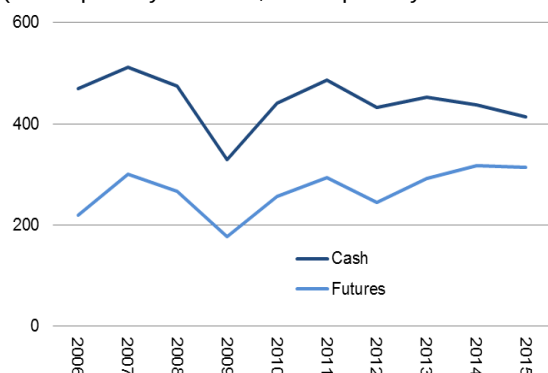
Exhibit A7 -- Annual average best-bid/best-offered price spread (32nds of price points, natural log scale)

Source: CME Group

To place these trends in broader context, one may recast trading volumes in terms of notional face value of Treasury note and bond exposures traded (rather than in number of contracts traded). By this measure, cumulative growth in aggregate Treasury futures transaction volume exceeded 22 percent, from \$257 bln per day in 2010 to \$314 bln per day in 2015 (Exhibit A8). Significantly, this outcome runs counter to contemporaneous trends in the underlying cash market for US Treasury notes and bonds, where trading volumes reported by U.S. government securities primary dealers to the Federal Reserve Bank of New York decreased by more than six percent, from \$441 bln per day in 2010 to \$413 bln per day in 2015.

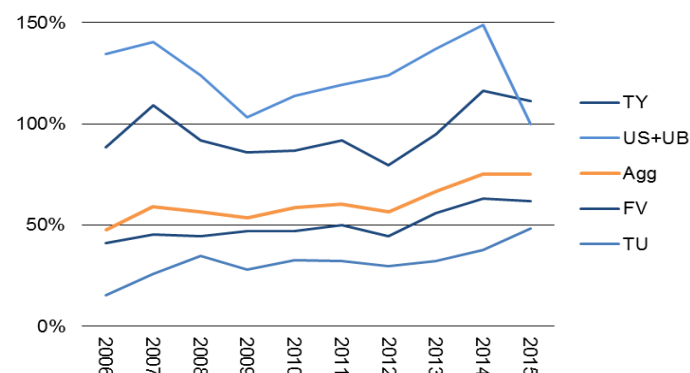
Exhibit A8**Annual average of daily trading volume: Treasury Note and Bond futures (Futures) and primary dealer transactions in US Treasury fixed-principal coupon-bearing securities (Cash)**

(\$ blns per day for Cash, \$ blns per day of contract notional face value for Futures)



Data sources: CME Group, FRBNY

Aggregate trading volume in Treasury futures, scaled relative to the volume of trade mediated by primary dealers in the cash market for Treasury fixed-principal notes and bonds, rose from less than 59 percent in 2010 to 75 percent in 2015 (Exhibit A9). The general uptrend in relative proportions manifests itself in different ways, however, at different points along the term structure of maturity. TU and FV futures, for instance, have enjoyed more or less steady gains. Between 2010 and 2015 TU trading volumes (sized relative to trading activity in fixed-principal coupon-bearing securities due in more than two years but no more than three years) soared from less than 33 percent to more than 48 percent, and FV trading activity (scaled relative to transaction volume in fixed-principal coupon-bearing securities due in more than three years but no more than six years) shot from 47 percent to nearly 62 percent.

Exhibit A9**Trading volume in Treasury Note and Bond futures scaled by primary dealer transactions in US Treasury fixed-principal coupon-bearing notes and bonds (percent)**

Data sources: CME Group, FRBNY

At the same time, TY trading activity has oscillated around 100 percent of trade flows in the proximate sector of the cash market (fixed-principal coupon-bearing Treasury securities due in more than seven years but no more than 11 years). From less than 87 percent in 2010, it ascended to a historical high of nearly 117 percent in 2014, edging back to 111 percent in 2015.

1.8

What share of trading (in the case of dealers, your own trading) is internalized? To what extent does it vary depending on security type (e.g., on-the-run, off-the-run)? How has this changed over time and how do you expect it to develop? What implications for the Treasury market, if any, do you see as a result of these developments?

These questions are largely moot for the Treasury futures markets. All futures must be traded on or subject to the rules of a CFTC-regulated exchange. Privately negotiated trades in futures are permitted to occur only as block trades or as components of transactions referred to as exchange of futures for related positions ("EFRP"), and then only if the listing exchange chooses to permit such trading under its rules. CME Group permits such trading in our Treasury futures contracts, but only in strict compliance with our rules. Such trades must be reported to the exchange, and submitted for clearing, designated by trade type. Thus, CME Group receives transaction data on such activity. Privately negotiated trades in Treasury futures via blocks or EFRPs comprise a very small percentage of trading volume in such contracts (eg, approximately 3.7% in 2015).

2.1

Are the risk management controls currently in place at U.S. Treasury cash and futures trading venues, as well as firms transacting in those venues, properly calibrated to support the health of the U.S. Treasury market? Why or why not? Please list the types of controls that are employed, as well as planned changes or improvements.

Please see Appendix C.

2.1.a.

To what extent should venue-level risk management practices be uniform across Treasury cash and futures trading venues? For example, should there be trading halts in the Treasury cash market and should they be coordinated between Treasury cash and futures markets, and if so, how? Should Treasury cash, futures, options, and/or swaps venues coordinate intraday risk monitoring, and if so, at what frequency? If there were trading halts, how should they be implemented for bilateral trading activity in the Treasury cash market? What would be the primary challenges in implementing such trading halts, particularly given that trading in the U.S. Treasury cash market is over-the-counter, global in nature, and conducted on a 24-hour basis?

Treasury Note and Bond futures and their companion options are not currently subject to price limits. Were there a regulatory basis for making the cash market for Treasury securities subject to organized trading halts, the exchange would be willing and able to countenance futures market price controls coordinated with such cash market regulatory regime. This is evidenced in the US equity index futures products listed for trading on the CME and CBOT DCMs, which for many years have been subject to trading halts explicitly coordinated with the system of regulatory trading halts codified by the US Securities and Exchange Commission¹¹ and implemented under, eg, New York Stock Exchange Rule 80B for Trading Halts Due to Extraordinary Volatility or Nasdaq Stock Market Rule 4121 for Trading Halts Due to Extraordinary Volatility.¹² (The extent of such intermarket and interjurisdictional coordination is

¹¹ US Securities and Exchange Commission, Plan to Address Extraordinary Market Volatility Submitted to the Securities and Exchange Commission Pursuant to Rule 608 of Regulation NMS Under the Securities Exchange Act of 1934 SRO Rulemaking, National Market System Plans, File 4-631.

¹² New York Stock Exchange Rule 80B is available at [javascript:parent.changeContent\('/nyse/rules/nyse-rules/chp_1_3/default.asp','chp_1_3',false\)](http://nyse.com/rules/nyse-rules/chp_1_3/default.asp?chp_1_3=false); Nasdaq Stock Market Rule 4121 is available at <http://nasdaq.cchwallstreet.com/>

exemplified in CME Rule 35802.I. for Price Limits and Trading Halts in CME E-mini Standard and Poor's 500 Stock Price Index Futures.)

2.7

Should self-trading be expressly prohibited in the cash Treasuries market? Does self-trading provide any benefits to the markets? Are there risk management tools, either at trading firms or at trading platforms, which can effectively reduce levels of self-trading and improve trading efficiencies?

Whether self-trading should be expressly prohibited in the cash Treasuries market would depend upon the scope of any such prohibition. With this in mind, it bears repeating that not all self-trading is prohibited in markets for Treasury Note and Bond futures.

What the CEA, CFTC regulations, and the rules of all CME Group exchanges expressly prohibit is illegal wash trades, in which market participants knowingly self-trade with the intent to avoid taking *bona fide* market positions that would be exposed to competitive market risk. Given that each market participant is obliged to comply with this (and all other) exchange rules, moreover, firms and market participants are expected to review their operations and, where appropriate, to take all steps necessary to minimize the potential for illegal wash trades.

However, there can be instances where buy and sell orders are unintentionally matched for accounts with common beneficial ownership, but where such buy and sell orders have been independently initiated, for legitimate purposes that represent *bona fide* buying and selling interest. These instances have been recognized by the CFTC in its Proposed Regulation AT as being legitimate occurrences of self-matching that contribute to the price discovery process. We believe that removing legitimate and *bona fide* self-match trades – where market participants have in place independence of traders/trading groups/algorithms – will only degrade the price discovery process. (These regulatory determinations, which we have made in the best interests of our markets, are set forth in Rule 534 in the Rulebook of each of the CME Group Exchanges, and in CME Group Market Regulation Advisory Notice Number RA 1411-5RR (2 January 2015).)

In short, whether an inadvertent self-match transaction violates the prohibition on wash trades is, and should be, determined in light of the facts and circumstances of the event, not according to rigid, absolute, or arbitrary thresholds. For this reason, the exchange's Market Regulation Department scrutinizes self-matched transactions on a case-by-case basis, to determine if a given trade violates the CEA wash-trade rule. The Market Regulation Department employs sophisticated surveillance and regulatory systems to identify any trade in which the opposing sides are executed for the same beneficial account, as well as trades in which opposing sides are executed for different accounts with the same ownership. The exchange scrutinizes each such transaction in various ways, including to confirm whether the parties were the same account or different, whether the transaction arose from trade matching by way of implied pricing, whether the trade resulted from outright buy or sell orders or through intramarket or intermarket spread orders, whether orders matched in the transaction were entered by automated or manual means, whether such orders were entered during one CME Globex session or multiple sessions, and whether the self-match occurred during the closing period of the futures or option contract at issue.

Any market participant is afforded the flexibility to determine the most effective means to achieve compliance, given the nature of its businesses and its trading strategies. Although CME Globex SMP functionality (or other third-party or proprietary tools for blocking wash trades) is available to aid in compliance, the use of such functionality is not the only means by which a market participant may comply with exchange rules or mitigate the occurrence of self-match events. For example, firms may choose instead to modify, refine, or re-calibrate their trading strategies to accomplish the same objective. Additionally, existing wash-trade-blocking technology may fail to meet the specific needs of every market participant in every circumstance, or may fail to block all self-match transactions.

Appendix B

Liquidity in US Interest Rate Markets

Exhibit B1 summarizes daily transactions in major US fixed income markets. The most common method for measuring volume is either in contracts per day (for futures) or notional value per day (for OTC markets). One major limitation to this method is that it does not fully reflect amount of risk transfer, which is better expressed in interest rate sensitivity, as gauged in terms of price response to a general change in market rates of one basis point per annum (DV01). We are able to approximate the aggregate DV01 of daily transactions in major markets, but this cannot be precisely calculated without detailed transaction-level data. Another limitation of this data set is that the volumes are aggregated over periods of time and therefore do not isolate the specific differences in liquidity around particular events.

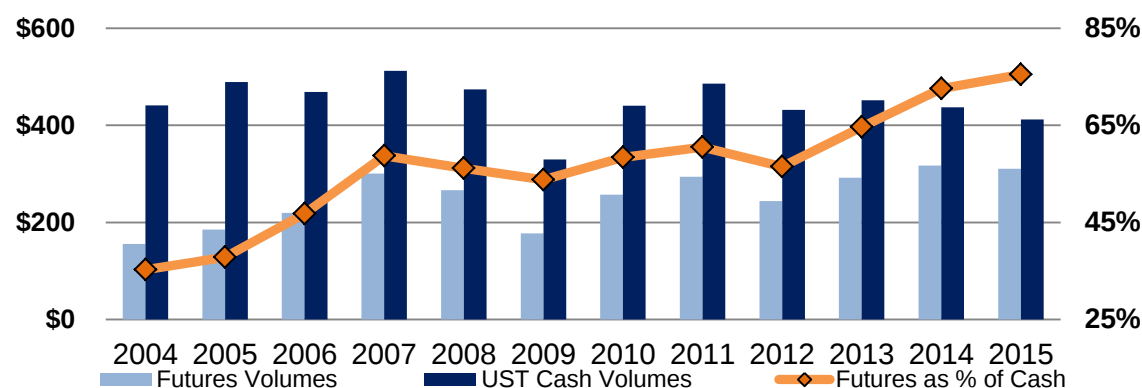
Exhibit B1 -- 2015 Daily Trading Volume in US Fixed Income Markets

	Notional (\$blns/day)	DV01 (\$ mlns/bp/day)
US Treasury Cash*	413	238
US Treasury Futures	314	266
ED Futures	2,320	58
Cleared USD Swaps	227	111

*Cash data are fixed-principal coupon-bearing securities only. Source: FRBNY

In 2015 the notional value of Treasury futures trading volume was 75% of trading volume in US government securities (as reported by primary dealers to the Federal Reserve Bank of New York). In 2012 the same proportion was 56%. In 2005 it was a mere 37% (Exhibit B2). A recent analysis published by JP Morgan compares Treasury futures trading volumes to cash market traffic in on-the-run (recently issued) Treasury notes and bonds¹³ If trading activity is gauged, as above, in terms of notional trading volume of futures versus value of cash, then futures trading has risen from a share of 80% of cash market trading volume in 2012 to a share of 120% in 2015. If instead trading flows are measures in terms of aggregate notional DV01 of futures traded relative to aggregate DV01 of Treasury securities traded, then futures activity swells to 160% of cash market volume in 2015 versus 100% in 2012.

Exhibit B2 -- Trends in Trading Volume in Futures and Cash Securities (\$ blns/day, unless otherwise noted)



*Cash data are fixed-principal coupon-bearing securities only. Source: FRBNY

¹³ Younger, Joshua, Alberto Iglesias, and Devdeep Sarkar, "24 Hour Party People Redux", North America Fixed Income Strategy, J.P. Morgan, 27 January 2016.

Outstanding Positions

Exhibit B3 summarizes outstanding positions in USD interest rate futures as of February 2016 month-end. The aggregate interest rate sensitivity, ie, the aggregate DV01, is massive, \$1 billion per basis point.

Exhibit B3 -- Open Interest in Major USD Interest Rate Futures, 29 February 2016

	<i>Contracts</i>	<i>Notional (\$ blns)</i>	<i>DV01 (\$ mlns/bp)</i>
ED Futures Whites	4,779,089	4,779.1	119
ED Futures Reds	3,216,676	3,217.7	80
ED Futures Greens	1,696,096	1,696.1	42
ED Futures 4+ yrs	1,134,005	1,134.0	28
2 Yr Note(TU)	1,071,735	107.2	39
5-Yr Note (FV)	2,669,615	267.0	129
10-Yr Note (TY)	3,020,687	302.1	233
Ultra 10-Yr Note (TN)	76,617	7.7	9
T-Bond (US)	551,181	55.1	126
Ultra T-Bond (UB)	629,619	63.0	184
Fed Funds	837,383	4,186.9	35
Total	19,682,703	15,815	1,025

Source: CME Group

Participation

Treasury futures markets feature a broad and diverse mix of participant types, providing excellent trading opportunities for both individual traders and institutional trading accounts (Exhibit B4)

Exhibit B4 –

Average Open Interest Holdings of CBOT 10-Year Treasury Note (TY) Futures by Market Segment, 2015

	<i>Avg Long Open Interest (Contracts)</i>	<i>Avg Short Open Interest (Contracts)</i>	<i>Avg Number, Long OI Holders</i>	<i>Avg Number, Long OI Holders</i>
Asset Managers	1,332,325	1,128,794	60	78
Dealers	146,009	181,623	15	37
Leveraged Money	558,568	802,575	48	65
Other Reportable	392,571	198,209	16	38
Non-Reportable	315,684	433,956	n/a	n/a
Total	2,745,157	2,745,157	140	218

Source: CFTC

The number of large open interest holders in USD interest rate futures has been growing over the years, with particular strength from the asset management segment (Exhibit B5).

The depth and breadth of the Treasury futures liquidity pool facilitates trading of Treasury note and bond exposures from either the long side or the short side of the market.

Exhibit B5 -- Large Open Interest Holders in CME Group Interest Rate Futures & Options

Group	24 Feb 2015	23 Feb 2016	Change
Asset Manager Long	189	257	+68
Asset Manager Spreading	260	285	+25
Asset Manager Short	260	263	+3
Dealer Long	118	82	-36
Dealer Short	195	204	+9
Dealer Spread	215	210	-5
Leveraged Money Long	261	268	+7
Leveraged Money Short	365	369	+4
Leveraged Money Spread	295	304	+9
Other Reportable Long	78	90	+12
Other Reportable Short	205	151	-54
Other Reportable Spreading	108	105	-3
Total Across Clients Long/Short	1,629	1,648	+19

Source: CFTC

Market Price Volatility and Size of Central Limit Order Book

Any measure of liquidity that includes scale of central limit order book must consider the impact of changes in market volatility, because quoted resting amounts tend to vary inversely with volatility levels.

When resting size at best bid and best offered price levels for Treasury Bond (US) futures, for instance, is measured over the last three years or so, the size levels range from around 445 contracts to more than 1,211 contracts. 79% of size variation can be explained by coeval changes in market expectations of near-term price volatility, as reflected in prices of options on Treasury Bond futures. (For this analysis, implied volatility is preferable to realized volatility, because the behavioral linkage in question concerns how the magnitude of resting orders responds over time to changes in market expectations of price volatility, irrespective of whether realized price volatility actually changes in accord with market expectations.)

Comparable findings obtain for 10-Year Treasury Note (TY) futures and 5-Year Treasury Note (FV) futures.

Although the results shown here are based on monthly time aggregation of data, similar correlative relationships manifest in market data in which the level of time aggregation is much finer (eg, one minute).

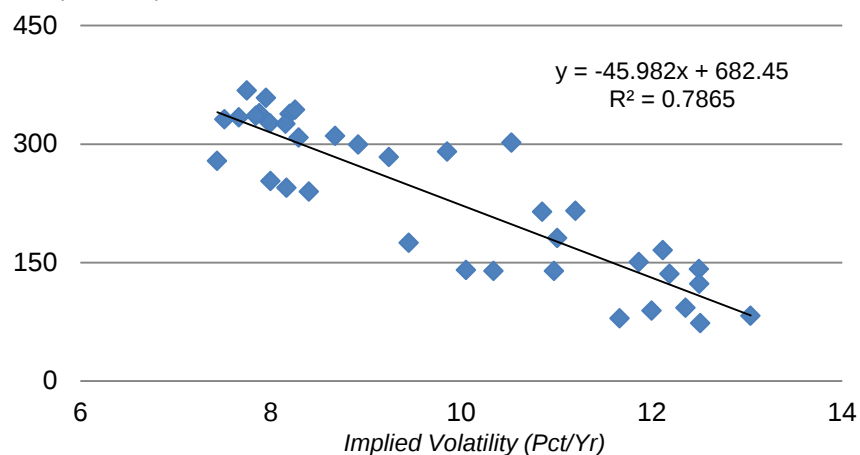
The following plots illustrate with data for the 38-month interval from Jan 2013 through Feb 2016, inclusive. Within each data scatter, each data point represents a single month. For any month –

implied volatility is the monthly average of daily implied volatility levels, computed on the basis of daily settlement prices of at-the-money CBOT options corresponding to the futures contract.

the book size is the monthly average of resting amounts quoted at best bid and best offered price levels, with averaging restricted to “regular trading hours” (7am to 4pm Chicago time).

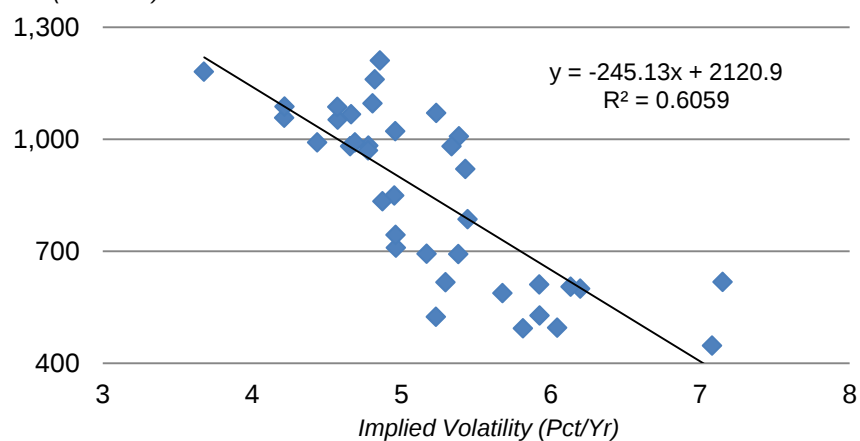
Book Size at
Best Bid/Offer
Pxs (Contracts)

T-Bond Futures Book Depth vs Implied Vol



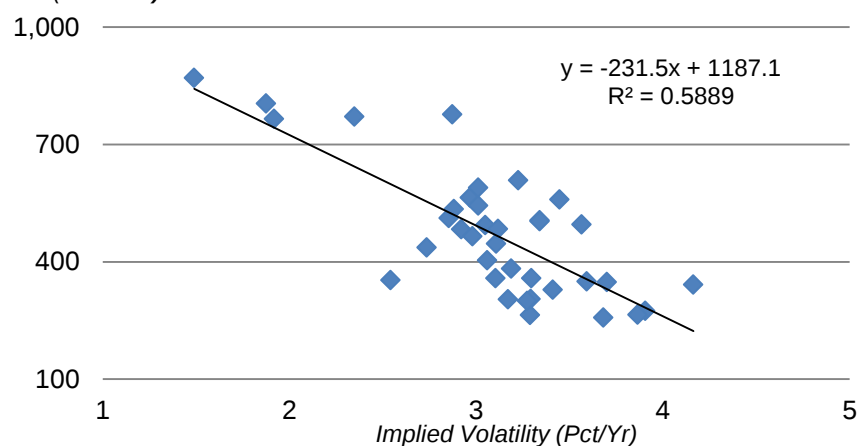
Book Size at
Best Bid/Offer
Pxs(Contracts)

10-Yr T-Note Futures Book Depth vs Implied Vol



Book Size at
Best Bid/Offer
Pxs(Contracts)

5Yr T-Note Futures Book Depth vs Implied Vol



Data Source: CME Group

APPENDIX C

CME GROUP MARKET INTEGRITY CONTROLS, SYSTEM SAFEGUARDS, AND RISK MANAGEMENT

CME Group employs significant human and technological resources and capabilities throughout the company to identify and mitigate the risk of market disruptions and also provides an array of tools designed to assist customers in effectively managing and mitigating these risks. CME Group's commitment to protecting the integrity of its markets is reflected in the continuous evolution of its risk management capabilities and services and its success in identifying innovative solutions to the risk management challenges arising from the dynamic changes in our industry. The following is a high level description of many of the risk management assets CME Group employs to protect against market disruptions.

CME Globex Risk and Volatility Mitigation Tools

The CME Globex electronic trading platform ("CME Globex") incorporates numerous market integrity controls and system safeguards. These serve to benefit all of the exchange's market participants by mitigating the impact of operational errors, abnormal risk, or extraordinary volatility, including such errors and abnormalities as may be associated with high-frequency trading activity. Such market integrity controls, reviewed briefly here, include:

Trading Services – Market Integrity Controls

Messaging Controls
Price Limits and Circuit Breakers
Price Banding
Stop Logic
Velocity Logic
Protection Functionality for Market & Stop Orders

Market Maker Protections

Order Management

Maximum Order Size Protection

Risk Management Services

Globex Credit Controls
Kill Switch
Risk Management Interface
Cancel-on-Disconnect Protection
Self-Match Prevention

Messaging Controls

- Sustained excessive messaging to CME Globex may be indicative of a potentially malfunctioning automated order entry system or other issues. To mitigate such risks and protect the market and market participants, CME Group employs automated controls at the session (connection) level to monitor for excessive messaging.
- Messaging Volume Controls: If a connection exceeds the CME Group established message per second threshold over a rolling three second period, subsequent messaging will be rejected by the trading engine until the average message per second rate falls below the threshold.
- Mass Quote Governor: Mass quoting functionality, used exclusively by CME Group approved market makers, allows bids and offers on a large number of options to be entered simultaneously

in a single order message, thereby increasing quoting efficiency. The Mass Quote Governor functionality measures the number of quotes per second for each session and will reject new mass quote messages and cancel resting quotes if the number of messages exceeds the allotted quote per second limit over a defined number of seconds. This functionality prevents excessive mass quote messaging that could otherwise result in disruptive quote processing inefficiencies for customers.

Price Limits and Circuit Breakers

- The terms and conditions of numerous CME Group products incorporate rules that establish daily price limits and/or circuit breakers in order to promote market confidence and to mitigate risks to the market infrastructure by allowing market participants time to assimilate information and mobilize liquidity during periods of sharp and potentially destabilizing price swings. Circuit breakers are calibrated at defined price levels and, if triggered, halt trading completely either for a defined period of time or for the balance of the day's trading session. Price limits, by contrast, allow trading to continue, but only within the defined limits.
- Special Price Fluctuation Limits, or circuit breakers, are similar in both spirit and function to the price limits that apply to CBOT and CME US equity index futures products. In essence, they extend the same discipline to nearly all products listed on CMEG designated contract markets. (See <https://www.cmegroup.com/tools-information/lookups/advisories/ser/files/SER-7259.pdf>)

The circuit breaker thresholds currently applicable to Treasury Note and Bond futures (codified in Rule 589 of CBOT Rulebook Chapter 5) became effective 21 Dec 2014, and are as shown in Exhibit C1.

Exhibit C1 -- Circuit Breakers for CBOT Treasury Note and Bond Futures (futures price points)

	<i>Level 1</i>	<i>Level 2</i>	<i>Level 3</i>	<i>Level 4</i>	<i>Level 5</i>
<i>Extended Trading Hours (17:00 - 7:20 CT)</i>					
TU	1	2	3	4	No Limit
FV	2	4	6	8	No Limit
TY	2	4	6	8	No Limit
TN	2	4	6	8	No Limit
US	3	6	9	12	No Limit
UB	3	6	9	12	No Limit
<i>Regular Trading Hours (7:20 - 17:00 CT)</i>					
TU	3	4	5	6	No Limit
FV	6	8	10	12	No Limit
TY	6	8	10	12	No Limit
TN	6	8	10	12	No Limit
US	9	12	15	18	No Limit
UB	9	12	15	18	No Limit

Source: CME Group

- Treasury Note and Bond futures and their companion options are not currently subject to price limits. Were there a regulatory basis for making the cash market for Treasury securities subject to organized trading halts, the exchange would be willing and able to countenance market price controls coordinated with such cash market regulatory regime.

This is evidenced in the US equity index futures products listed for trading on the CME and CBOT designated contract markets, which for many years have been subject to trading halts explicitly coordinated with the system of regulatory trading halts codified by the US Securities and

Exchange Commission¹⁴ and implemented under, eg, New York Stock Exchange Rule 80B for Trading Halts Due to Extraordinary Volatility or Nasdaq Stock Market Rule 4121 for Trading Halts Due to Extraordinary Volatility.¹⁵ (The extent of such intermarket and interjurisdictional coordination is exemplified in CME Rule 35802.I. for Price Limits and Trading Halts in CME E-mini Standard and Poor's 500 Stock Price Index Futures.)

Price Banding

- To help ensure fair and orderly markets, CME Globex subjects all orders to price verification upon entry by using a process called price banding. Price banding is designed to prevent the entry of orders at clearly erroneous prices, such as a bid at a limit price substantially above the market, thereby mitigating the potential for a market disruption.
- Futures Price Banding: For each product, CME Group establishes a Price Band Variation parameter which is a static value that is symmetrically applied to the upside for bids and the downside for offers relative to a reference price. The reference price, referred to as the Banding Start Price, is a dynamically calculated value based on market information such as: last trade price, bid and offer price, or an indicative opening price. Orders entered at prices beyond the Price Band Variation parameter relative to the reference price are rejected by the Globex engine.
- Options Price Banding: Options price banding functionality is similar to futures price banding except that the Banding Start Price may reference, in addition to last trade price, a theoretical option prices based on established option pricing models. Additionally, the width of the price bands may be either a static value for a particular option series, a dynamic value that adjusts based on the option's delta, or a delta-adjusted percentage of the option's theoretical price.

Stop Logic

- Stop Logic functionality is CME Group proprietary functionality that serves to mitigate market spikes which can occur because of the continuous triggering and trading of stop orders in an illiquid market condition. On CME Globex, if elected stop orders would result in execution prices that exceed pre-defined thresholds, the market automatically enters a reserve period for a prescribed number of seconds; the length of the pause ranges from five to 20 seconds and varies based on the characteristics of the product and time of day at which the stop logic event is triggered. When a futures contract designated as a lead month contract experiences a Stop Logic event, associated options markets are paused and Mass Quotes canceled. During the reserve period, new orders are accepted and an indicative price is published, but trades do not occur until the reserve period expires, thereby providing an opportunity for participants to respond to the demand for liquidity.
- For Treasury Note and Bond futures, the Stop Logic thresholds are as shown in Exhibit C2.

¹⁴ US Securities and Exchange Commission, Plan to Address Extraordinary Market Volatility Submitted to the Securities and Exchange Commission Pursuant to Rule 608 of Regulation NMS Under the Securities Exchange Act of 1934SRO Rulemaking, National Market System Plans, File 4-631.

¹⁵ New York Stock Exchange Rule 80B is available at [javascript:parent.changeContent\('/nyse/rules/nyse-rules/chp_1_3/default.asp','chp_1_3',false\);](http://www.nyse.com/rules/nyse-rules/chp_1_3/default.asp?chp_1_3=false) Nasdaq Stock Market Rule 4121 is available at <http://nasdaq.cchwallstreet.com/>

Exhibit C2 -- Stop Logic Thresholds for CBOT Treasury Note and Bond Futures

Stop Logic Threshold (32nds of 1 futures price point)	
UB	20
US	20
TY	20
FV	8
TU	4
3-Month Eurodollar Futures	0.1 points = 10 basis points

Source: CME Group

Velocity Logic

- Velocity Logic is a patented, proprietary functionality within the Globex trading engine that is designed to detect significant price moves of Futures contracts occurring within a predetermined period of time. Velocity Logic is capable of detecting market movements originating from any type of order accepted on Globex. If a sub-second, extreme market move occurs as a result of order entry, Velocity Logic will introduce a momentary suspension in matching by transitioning the futures instrument(s) and related options in question into a reserved/pause state for a prescribed number of seconds; the length of the pause ranges from 5 to 20 seconds and varies based on the characteristics of the product and time of day at which the event is triggered. During the reserve period, new orders are accepted and an indicative price is published, but trades do not occur. When the reserve period expires, the market will re-open and trading will resume.
- For Treasury Note and Bond futures, the Velocity Logic thresholds are as shown in Exhibit C3.

Exhibit C3 -- Velocity Logic Thresholds for CBOT Treasury Note and Bond futures

Velocity Logic Threshold (32nds of 1 price point)	
UB	48
US	48
TY	48
FV	24
TU	12
3-Month Eurodollar Futures	0.3 points = 30 basis points

Source: CME Group

Protection Functionality for Market & Stop Orders

- CME Group employs proprietary functionality that assigns a limit price (protection point) to each market order entered on the CME Globex platform and to each stop order entered without a limit price. This functionality prevents orders from being filled at significantly aberrant price levels because of the absence of sufficient liquidity to satisfy the order at the time the market order is entered or the stop order is triggered.
- The protection points for each product are generally set to one half of the product's "Non-Reviewable Range," a value that is established in connection with the exchange's Trade Cancellations and Price Adjustments rules. The protection point is measured from the best bid price for sell market orders, the best offer price for buy market orders, and the stop trigger price for stop orders. Any quantity on the order that is unfilled at the protection point level becomes a resting limit order at that price.

Market Maker Protections

- Market Maker Protection functionality provides CME Group registered options market makers using Mass Quote functionality the ability to set various parameters which help to mitigate their quote execution exposure. These protections include limits on the number of quotes executed in their entirety, the number of separate executions, the number of unique instruments traded and the net quantity of instruments traded. When the market maker's defined protection values are met or exceeded within a 15 second interval, the protections are triggered and outstanding quotes are automatically cancelled. Additionally, market makers can set delta protection values to limit exposure. These protections help to reduce the potential for disruptive trades by facilitating greater liquidity and mitigating the possibility of a party taking on excessive exposure.

Maximum Order Size Protection

- Maximum order size protection is embedded Globex functionality that precludes the entry of an order into the trading engine if the order's quantity exceeds a pre-defined maximum quantity. Orders entered for a quantity greater than the prescribed maximum quantity are rejected at the Globex gateway before reaching the Globex engine. This functionality helps to avoid market disruptions by preventing the entry of erroneous orders for quantities above the designated threshold.

Globex Credit Controls

- CME Group requires clearing firms to employ CME Globex Credit Control functionality which provides automated pre-trade risk controls at the trading firm level without introducing additional order processing latency. The specific credit limits for each trading firm are established by the Clearing Firm Risk Administrator.
- Clearing Firm Risk Administrators are able to select automated real-time actions if the established risk limits are hit, including e-mail notification, blocking of non-risk-reducing orders and the cancellation of working orders; the Administrator can also set levels at which early warning notifications will be automatically generated.
- CME Globex Credit Controls provide protection against high level risks arising from adverse execution activity and are intended to complement rather than replace the risk management tools used by clearing firms to manage risk at the more granular trader and account level.

Kill Switch

- CME Globex Kill Switch is a GUI designed to allow clearing firms a one-step shutdown of all their CME Globex activity at the SenderComp ID (Tag 49) level. When CME Globex Kill Switch functionality is activated by the permissioned firm, all order entry is blocked and all working orders are cancelled for either a selected subset or the entire firm's SenderComp IDs.
 - All Clearing Firms may access the Kill Switch which appears as a separate tab in the same GUI where Globex Credit Controls reside.
 - Clearing firms may also authorize Globex execution firms to leverage the Kill Switch for their own business. Clearing firms' orders always take precedence over non clearing firms' instructions.
 - Customers subject to a Kill Switch action are prevented from submitting any message that could modify or result in an order.
 - Customers subject to a Kill Switch action trying to submit orders receive a reject message with entity level (clearing or execution firm) and administrator role information.

The Risk Management Interface (RMI)

The Risk Management Interface (RMI) is both an API and GUI that supports granular, pre-trade risk management. Clearing firms can leverage Drop Copy to feed real time executions into their proprietary risk systems. The proprietary risk systems can in turn leverage the RMI API to trigger blocking or cancellations based on the clearing firm's independent calculations. Certification is required to support the RMI API, and access to the RMI API is limited to Clearing Firms' certified proprietary and third-party risk management applications.

The RMI API allows Clearing Firms (or third party risk system providers) to programmatically send instructions to:

- Block/Unblock order entry at the execution firm/account/derivative type (future or option)/side/product levels;
- Query current block/unblock instructions; and
- Cancel working orders, including Good Til Cancel (GTC) and Good Til Date (GTD) order types.

The RMI GUI is a web-based user interface that allows Clearing Firms to:

- Block/Unblock order entry at the same levels as the API; and
- View current blocks.

Cancel on Disconnect Protection

- Cancel on Disconnect functionality is an opt-in free service that allows for the automatic cancellation of resting day orders when a user's connection to Globex involuntarily drops.

Self-Match Prevention

- Self-Match Prevention (SMP) is optional functionality designed to allow firms to prevent, where appropriate, buy and sell orders for accounts with common beneficial ownership, from matching with each other.
- Customers who opt to use SMP functionality are required to populate any order message sent to CME Globex with a specific SMP ID. When CME Globex detects buy and sell orders with the same SMP ID and Executing Firm ID at the same executable price level, CME Globex automatically cancels the resting or incoming (aggressing) order(s) based on the SMP instruction submitted by the customer.
- In markets for which the trade matching algorithm is First-In-First-Out (FIFO), such orders are cancelled only if they would match. In markets for which the trade matching algorithm is not FIFO, such orders are cancelled unconditionally.
- Market participants have flexibility in how to apply SMP functionality, based upon their particular business structure, but in all cases registration is required for use of the SMP functionality.
- Provided that orders are independently initiated in good faith for the purpose of executing *bona fide* transactions, self-matched trades violate no exchange rules, nor any provision of the Commodity Exchange Act, nor CFTC regulations. In such circumstances, self-matched trades are at worst benign. At best, they contribute to the price discovery process, as legitimately and

fairly as trades initiated by independent traders at different firms. In this light the exchange recognizes that many firms have proprietary trading operations in which multiple traders, making fully independent decisions, may enter orders for a commonly owned account (ie, the firm's account) that may unintentionally and coincidentally be matched with each other.

- The exchange's Market Regulation Department conducts routine reviews of firms with elevated levels of intra-firm trading. Among other aspects of their operational and compliance frameworks, such firms are queried about physical and technological barriers between individuals or trading teams, how firm profits and losses are accounted for and allocated, and shared services, development, oversight, and testing. The exchange also employs sophisticated surveillance systems and knowledgeable staff to review instances of self-matching.
- Trading firms that participate in exchange-sponsored trading volume incentive programs are urged to employ SMP functionality (or alternative means) to prevent incidental self-match events and to comply with Exchange rules. The exchange has the capability to ensure that incidental self-match transactions made by a participant in any such volume-related incentive program shall be excluded from participant volume calculations

Additional Risk Management Services

Drop Copy Risk Management Service

- CME Group's Drop Copy service allows customers to receive, via a FIX messaging interface, real-time copies of Globex execution reports, acknowledgement and reject messages. This enables firms to feed the data to their internal risk systems, allowing firms to monitor risk on a real time basis. The Drop Copy service also allows for monitoring of aggregate activity guaranteed by one or more clearing firms upon approval of the clearing firms.

FirmSoft Order Management Tool

- FirmSoft is a browser-based order management tool which provides real-time access to information on working and filled Globex orders, as well as order modification history. Access to FirmSoft can be granted based on one or more Trader IDs, sessions and/or account numbers.
- FirmSoft also allows users to cancel an individual order, a group of orders or all working orders and mass quotes. The "Cancel All" or "Kill Button" functionality provides important risk mitigation functionality at all times including during system failures.

Risk Protection Policies and Rules

Access and Controls

- All direct connections to CME Globex require the execution of a Customer Connection Agreement that includes, among other provisions, a requirement that the connection be guaranteed by a clearing member firm which agrees to be financially responsible for all orders sent to the Globex platform through the connection.
- Any clearing member firm providing CME Globex access to its customers must comply with all Credit Control requirements set forth in the Customer Connection Agreement which include requirements that there be separation between trading and credit control functions; that the clearing firm be able to set, monitor and adjust credit control parameters such as quantity, position and exposure limits; that the clearing firm be able to set pre-execution controls through automated means or by requiring an employee to take action to accept orders; and that the clearing firm be able to revoke a trader's access to the market.

- The Customer Connection Agreement requires the entity obtaining the connection to agree to comply with and be subject to the rules of the CME Group exchanges. Additionally, clearing members guaranteeing a connection to Globex are responsible for ensuring that the order routing/front-end audit trail for all electronic orders is maintained for a minimum of five years.

Certification and Testing

- All entities connecting directly to CME Globex must perform application testing and be certified by CME Group with respect to a broad scope of interface and functionality requirements before accessing the production environment. CME Group provides customers with dedicated testing and certification environments which, in combination with the certification requirements, mitigate the risk of customer systems adversely affecting CME Group markets or the customer's own business.

The CME Globex Certification environment mirrors production functionality and is used by customers to perform certification testing for core Globex functionality, maintenance testing and development testing for new customer system features or functionality.

- The CME Globex New Release environment is used by customers to perform development and certification testing with respect to new Globex functionality as well as to test new products prior to their production launch.

Risk Management

- All CME Group exchanges have a Risk Management rule (Rule 982) which requires clearing members to have written risk management policies and procedures in place to ensure they are able to perform basic risk and operational functions at all times including: monitoring credit risks of customers and proprietary trading activity; limiting the impact of significant market moves through the use of tools such as stress testing or position limits; maintaining the ability to monitor account activity on an intraday basis; and ensuring that order entry systems include the ability to set automated credit controls or position limits or otherwise require a firm employee to enter orders. The CME Clearing Risk Management Department periodically conducts reviews of clearing firm risk management policies, procedures and capabilities and how well those risk management programs correspond to the firm's lines of business.

Trade Cancellation and Price Adjustment Rules

- All CME Group exchanges have a Trade Cancellation and Price Adjustment rule (Rule 588) that is designed to balance market participants' legitimate expectations of trade certainty with the adverse effects on market integrity of executing trades and publishing trade information that is inconsistent with prevailing market conditions. This rule authorizes the Globex Control Center ("GCC") to adjust trade prices or cancel trades when such action is necessary to mitigate market disrupting events caused by the improper or erroneous use of the electronic trading system or by system defects. In order to enhance trade certainty and mitigate the creation of additional exposures, erroneous trades are price-adjusted rather than cancelled whenever possible.
- Rule 588 codifies an explicit non-reviewable price range for each futures product and an explicit methodology for determining the non-reviewable price range for each options product. The non-reviewable range is applied above and below the fair-value price determined by the GCC based on relevant market information. Transactions that occur outside of the non-reviewable range may be price-adjusted by GCC pursuant to a transparent methodology for establishing the adjusted price or cancelled by the GCC. Notwithstanding any other provisions of the rule, the GCC has the authority to adjust trade prices or cancel any trade if the GCC determines that allowing the trade to stand as executed would have a material, adverse effect on the integrity of the market.

- Rule 588 also provides that a party entering an order that results in a price adjustment or trade cancellation is responsible for demonstrated claims of realized losses incurred by persons whose trade prices were adjusted or cancelled, provided that the harmed party took reasonable actions to mitigate any losses.

CME Globex Messaging Efficiency Program

- The CME Globex Messaging Efficiency Program is designed to encourage responsible messaging practices and discourage excessive messaging that does not contribute to market quality. Under the program, CME Group establishes messaging benchmarks based on a per-product Volume Ratio, which is defined as the ratio of the number of messages submitted to the volume executed in a given product. Generally, the Program will be administered at a CME Group executing firm level, but CME Group may, in its reasonable discretion, decide to apply the Program at a more granular level (i.e. iLink session, account or Tag 50). Further, CME Group may aggregate executing firms for purposes of determining whether a Product Group Benchmark has been exceeded in circumstances where a single entity is submitting messages via more than one executing firm number. Entities that exceed these thresholds and fail to correct their messaging practices pay a surcharge. This policy benefits all market participants by discouraging excessive messaging, which in turn helps to ensure that the trading system maintains the responsiveness and reliability that supports efficient trading.

User Identification and Automated Trading System Identification

- All orders must be submitted to CME Globex with a user identification tag (Tag 50 ID) that represents the party who input the order into the Globex system. The tag must be unique at the clearing firm level. In the case of an ATS, the Tag 50 identifies the person or team or persons who operate, administer, and/or monitor the ATS. If the ATS operator is responsible for multiple algorithms which operate in the same product, then each specific algorithm must be assigned a unique Tag 50 ID. Additionally, if the client receives preferential exchange fees, the name and other identifying information of the operator(s) must be registered with the exchange; in the case of an ATS operator this registration includes an ATS attribute that is attached to orders entered by that operator in the exchange's audit trail systems. Additionally, the Globex Control Center and Market Regulation Department have the authority to require that a customer with significant messaging register with the exchange, irrespective of whether the customer receives preferential fees.
- CME Group further requires that all users populate new tags associated with each order. The tags identify whether the particular order originates from an automated trading system or is manually entered, the geographic origin from which the order was submitted to the trading system, and the identification of the front-end system and version/release of the software used to enter the order.
- The user identification rules substantially aid the prompt evaluation and investigation of potentially problematic activity.