

EVALUATION OF CLEARINGHOUSE LIQUIDITY

A REPORT BY STAFF OF THE U.S. COMMODITY FUTURES TRADING COMMISSION

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List of Acronyms and Defined Terms

- 2016 Report – Supervisory Stress Test of Clearinghouses
- AUD - Australian Dollar
- CAD - Canadian Dollar
- BPS – Basis points
- CFTC - Commodity Futures Trading Commission
- CME – Chicago Mercantile Exchange, Inc.
- CZK - Czech Koruna
- DCO - Derivatives Clearing Organization
- DVP - Delivery Versus Payment
- EUR – Euro
- FCM – Futures Commission Merchant
- FX - Foreign Exchange
- GBP - British Pound
- HKD - Hong Kong Dollar
- HUF - Hungarian Forint
- ICEU – ICE Clear Europe
- ICUS - ICE Clear U.S. Inc.
- IM – Initial Margin
- IRS - Interest Rate Swaps
- JPY - Japanese Yen
- LCH - LCH Ltd
- LIBOR – London Interbank Offered Rate
- LSOC - Legally Segregated Operationally Commingled
- MXN - Mexican Peso
- NOK - Norwegian Krone
- NZD - New Zealand
- PLN - Polish Zloty
- SEK - Swedish Krona
- SGD -Singapore Dollar
- SIDCO - Systemically Important Derivatives Clearing Organization
- Staff – Staff of Division of Clearing and Risk, CFTC
- USD - US Dollar
- VM – Variation Margin
- ZAR – South African Rand

Executive Summary

A. Nature and Purpose of the Exercise

This is the second in a series of systemic stress test exercises conducted by staff of the Division of Clearing and Risk (“staff”) of the Commodity Futures Trading Commission (CFTC). In November 2016, staff published a report “Supervisory Stress Test of Clearinghouses” (2016 Report). The purpose of the 2016 exercise was to assess the impact of a set of stressed market conditions and defaults across multiple clearinghouses, with a focus on firms that held memberships at more than one clearinghouse. The stressed conditions involved hypothetical extreme but plausible scenarios. The “Next Steps” section of the 2016 report discussed plans to incorporate a number of enhancements and to conduct exercises of this nature on a regular basis.

Staff has now completed an exercise that addresses a subset of the enhancements listed in the 2016 Report. The purposes of the current exercise were to evaluate (i) whether clearinghouses could obtain in a timely manner the funds necessary to meet the settlement obligations resulting from the simultaneous default of two large clearing members and (ii) whether the need for multiple clearinghouses to generate liquidity simultaneously might have systemic implications.

Thus, the focus of this exercise was to evaluate funding liquidity, that is, the ability of a clearinghouse to access sufficient cash in the applicable currency to meet its daily settlement obligations within the timeframes set forth in its settlement cycle. The exercise did not address the liquidity of the underlying derivatives markets, that is, the ability of a clearinghouse to hedge and to liquidate the positions of a defaulting clearing member. Nor did the exercise address operational risk, or cybersecurity risk. As described in the “Next Steps” section of this report, these topics will be addressed in future exercises.

B. Scope of the Exercise

Staff analyzed the positions of all common clearing members at three clearinghouses registered as derivatives clearing organizations (DCOs) with the CFTC: Chicago Mercantile Exchange, Inc. (CME), ICE Clear US, Inc. (ICUS), and LCH Ltd (LCH). The exercise encompassed futures and options on futures cleared at CME and ICUS, and interest rate swaps (IRS) cleared at LCH and CME.

The default scenario assumed the simultaneous failure of the same two large clearing member firms and, as applicable, their five largest IRS customers, at each of the three DCOs. The hypothetical scenario created almost three times as much liquidity demand as would have been created if the two largest firms had defaulted following Brexit.

C. Key Findings

All of the clearinghouses demonstrated the ability to generate sufficient liquidity to fulfill settlement obligations during the immediate end-of-day cycle, and in the case of those clearing IRS, during subsequent payment cycles.

The clearinghouses generated funds in a number of ways. The range of methods included: (i) using cash received from maturing reverse-repurchase agreements, (ii) selling collateral, (iii) accessing cash balances at a commercial bank, (iv) accessing cash balances at a central bank, (v) converting one currency to another, and (vi) entering into repurchase agreements. The three clearinghouses used different combinations of these methods.

In instances where multiple DCOs used the same methodology or the same firm to raise funds, staff concluded that the cumulative size of liquidity requirements in this scenario would not impair the ability of each clearinghouse to meet its settlement obligations on time.

I. Background

A. Daily Settlement of Cleared Products

One of the most effective risk mitigating techniques in the clearing system for derivatives transactions is the daily settlement process. New trades and open positions are marked to current market prices and gains and losses are settled in cash at least once a day. At most derivatives clearinghouses, there is an additional intra-day cycle as well.

This mark-to-market process is a very rigorous form of risk mitigation. It ensures that losses are not allowed to accumulate for more than a single day. In fact, for clearinghouses conducting intra-day settlements, the usual exposure will be for less than one day.

This process, however, can create large liquidity demands in the event of a clearing member default. If a clearing member fails to meet its settlement obligations to a clearinghouse, the clearinghouse is still obligated to settle in cash to clearing members on the opposite side of the market in accordance with the established settlement cycle. The initial margin and guaranty fund deposits of the defaulting clearing member might be large enough to cover all losses, but they won't typically be all cash given that clearinghouse rules permit clearing members to post a variety of non-cash assets as collateral. Therefore, clearinghouses, by design, have arrangements in place to assure that sufficient cash is available to meet their settlement obligations.

The liquidity needs for DCOs clearing futures products are primarily in U.S. Dollars (USD) with some exceptions for futures contracts settled in foreign currencies. The liquidity needs for DCOs clearing IRS involve multiple currencies, including USD, Euros (EUR), and 14 other currencies.

End-of-day settlement cycles include the full range of settlement activities. These include the mark-to-market of all contracts and currencies and the payment and receipt of 100% of variation margin.

Intra-day settlement cycles often differ from end-of-day cycles. Examples of the differences include:

- Intraday cycles may not include all products settling in foreign currencies
- Intraday cycles may collect losses but not pay out gains
- Intraday cycles may collect all losses but pay out less than all gains.

The DCOs in this report that clear futures and options on futures run settlement cycles both intra-day and end-of-day. However, they also have rules allowing for flexibility in intra-day processing which can mitigate potential intra-day liquidity concerns. For example, as noted, a clearinghouse might choose to pay out less than all gains intra-day. The clearinghouses have rules in place, publicly disclosed, that allow for this kind of flexibility if temporarily needed to address intra-day liquidity.

The DCOs in this report that clear IRS pay out gains only once a day, at the end-of-day settlement cycle. They may collect losses one or more times intra-day. Consequently, for the IRS products, in the event of a default the DCOs only have liquidity needs once per day. Payment obligations for the currencies that generally account for the majority of variation margin are due at the end-of-day settlement cycle. The variation margin for the smaller, less-traded currencies is paid the following day.

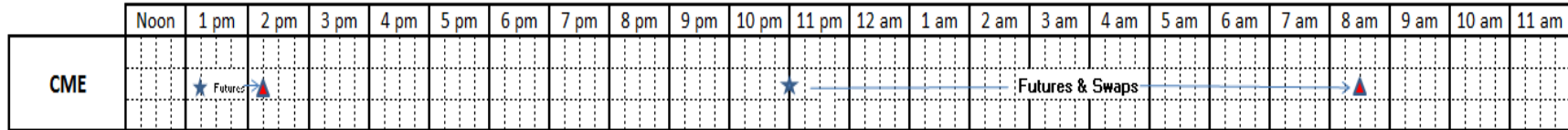
The settlement cycle for the three DCOs covered by this report is set forth below in Exhibit 1.

Exhibit 1: DCO VARIATION MARGIN TIMELINES

(all times eastern unless stated otherwise)

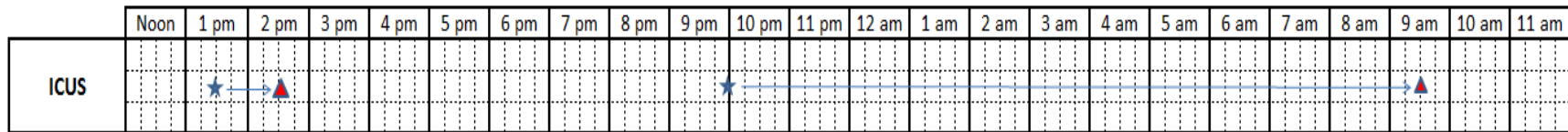
NOTE: The following timelines are provided for informational purposes only. All timeframes within these timelines should be verified with each DCO's rules and regulations. Each of these DCOs reserve the right to change the settlement cycle timings, or to run additional cycles.

CME Clearing

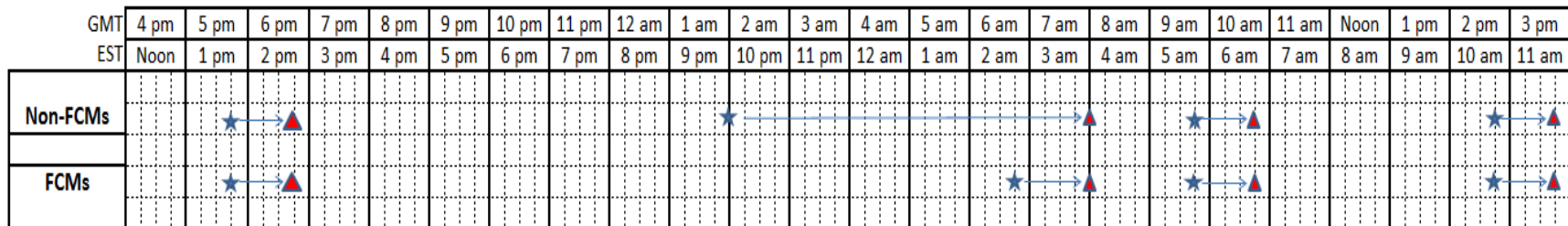


Footnote: CME does not have a routine intra-day cycle for cleared OTC, only for ETD.

ICE Clear US



LCH Swap Clear Limited

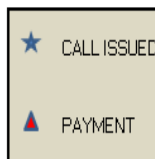


Footnotes: SwapClear LCH.Clearnet Ltd

SwapClear has 3 scheduled intra-day margin cycles every day, collecting margin at 05:45, 10:45 and 13:45 EST

The market data used in these intra-day cycles is taken approximately 1 hour before the margin call is issued.

Note: All timings are based on London timings (GMT), even though they are displayed in this chart in EST.



B. Role of Liquidity Risk Management in the Clearing System

For purposes of this report, the term liquidity refers to the ability of a clearinghouse to access enough cash in the applicable currency to meet its settlement obligations within the timeframes set forth in its settlement cycle. The term does not refer to the ability to liquidate cleared positions.

The CFTC has issued an extensive set of regulations applicable to clearinghouses related to liquidity risk management including requirements addressing liquidity resources, liquidity risk management procedures, liquidity stress testing, and reporting requirements.¹

Broadly stated, all DCOs must effectively measure, monitor, and manage their liquidity risks, and maintain sufficient liquid resources so they are able, at a minimum, to fulfill their cash obligations when due. Moreover, all DCOs must ensure that their liquidity resources are held in a manner where the risk of loss or of delay in its access to them is minimized. This includes the risk of loss from converting non-cash collateral into cash and the risk of delay in accessing cash.

The purpose of this exercise was not, however, to test whether each individual clearinghouse had the liquidity required by the regulations but rather to evaluate the impact of an extreme event on liquidity resources across clearinghouses. Given the differences among these clearinghouses in membership and in portfolio composition, testing clearinghouses individually would likely involve a different default scenario at each one. This study used a single scenario involving default across a specific group of clearinghouses.

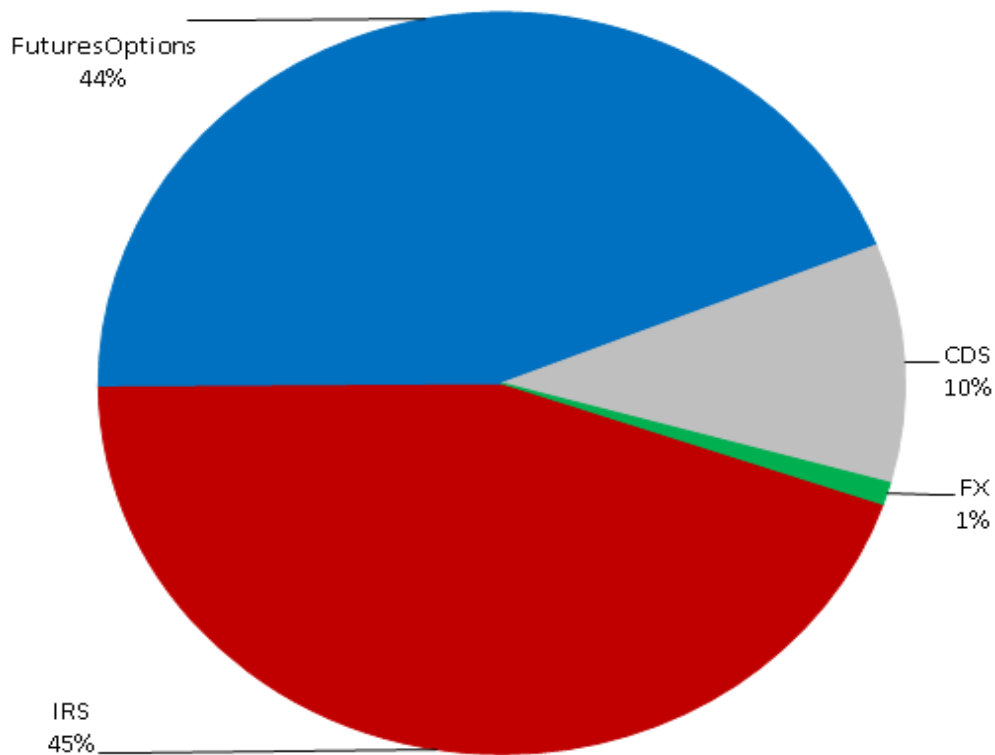
II. Methodology

A. Products

Currently, futures and options account for 44% of initial margin (IM) collected by DCOs. IRS accounts for 45%. The distribution of IM among products is summarized below in Exhibit 2.

¹ Derivatives Clearing Organization General Provisions and Core Principles, 76 FR 69334 (November 8, 2011); Derivatives Clearing Organizations and International Standards, 78 FR 72476 (December 2, 2013). In particular, see CFTC regulations 39.11(e), 39.33(c), and 39.36(c).

Exhibit 2: Total Initial Margin Requirements at all DCOs, August 16, 2017



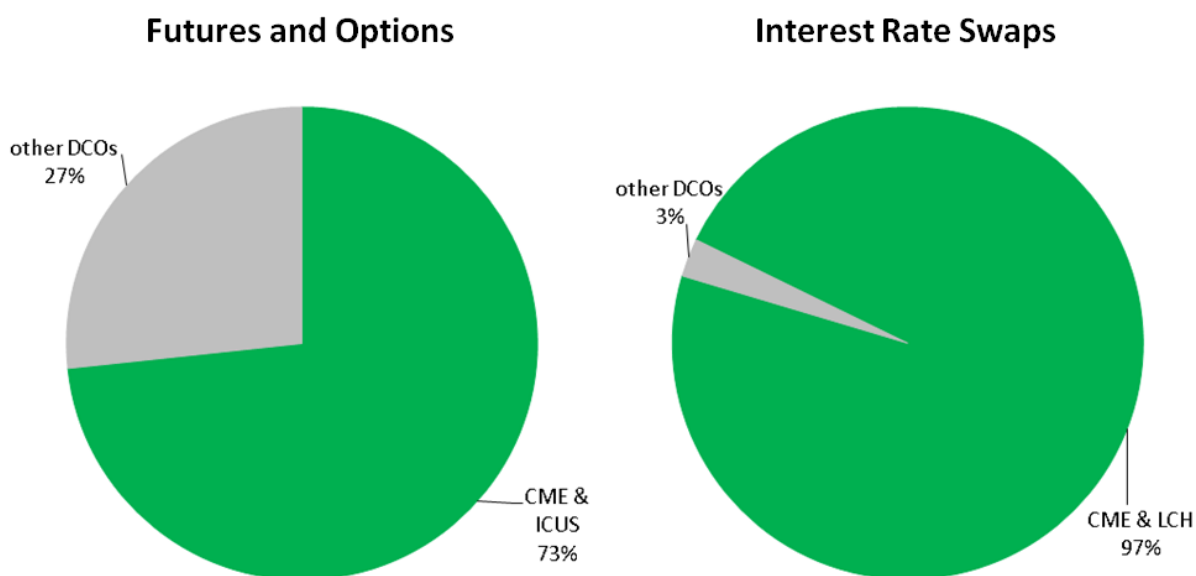
In conducting daily risk surveillance of DCOs, staff has observed that, consistent with the distribution of IM by asset class, all futures combined and IRS generate almost 90% of the daily settlement obligations at the largest clearing members. Accordingly, staff determined to limit this exercise to DCOs clearing these products.²

B. Clearinghouses

Currently, CME and ICUS hold approximately 73% of IM for futures and options at registered DCOs; LCH and CME hold approximately 97% of IM for IRS. These numbers are summarized below in Exhibit 3.

² Futures and options products included the following asset classes: interest rates, equities, energy, metals, agricultural, softs, and foreign currencies.

Exhibit 3: Total Initial Margin Requirements on August 16, 2017 In Scope and Out of Scope



In planning this review, staff determined that in order to have an adequate test of systemic DCO liquidity, at least three DCOs would need to be included. Once the asset classes were selected, staff selected DCOs that had large clearing members in each of the two asset classes. Accordingly, staff determined to limit this exercise to CME, ICUS, and LCH.

C. Stress Scenarios

Testing the sufficiency of liquidity at a single DCO involves somewhat different considerations than testing the potential systemic impact of defaults at multiple DCOs. The scenario that causes the largest cumulative losses across DCOs is likely to differ from the scenarios that cause the largest loss at each individual DCO.

Moreover, in order to make legitimate comparisons among clearinghouses, it is important that the severity of the liquidity stress be similar at each clearinghouse. Therefore, staff needed to identify a price scenario and a pair of defaulting firms that would result in a stress loss that was not only extremely large overall but that was also proportionately stressful at each DCO.

Staff notes that this exercise measures the DCOs' liquidity resources and operational capabilities against standards that, in some respects, exceed those required by CFTC

regulations. Accordingly, this review should not be interpreted as a standard setting exercise.

Because the cleared IRS market is now larger than the futures markets, as measured by initial margin, staff started the analysis with IRS. Staff initially ran 179 stress test scenarios on the interest rate swap portfolios of all clearing members at both CME and LCH in order to identify the scenarios that generated the largest losses. These scenarios included both historical and hypothetical market movements. Positions as of close-of-business on August 16, 2017 were used for this exercise.

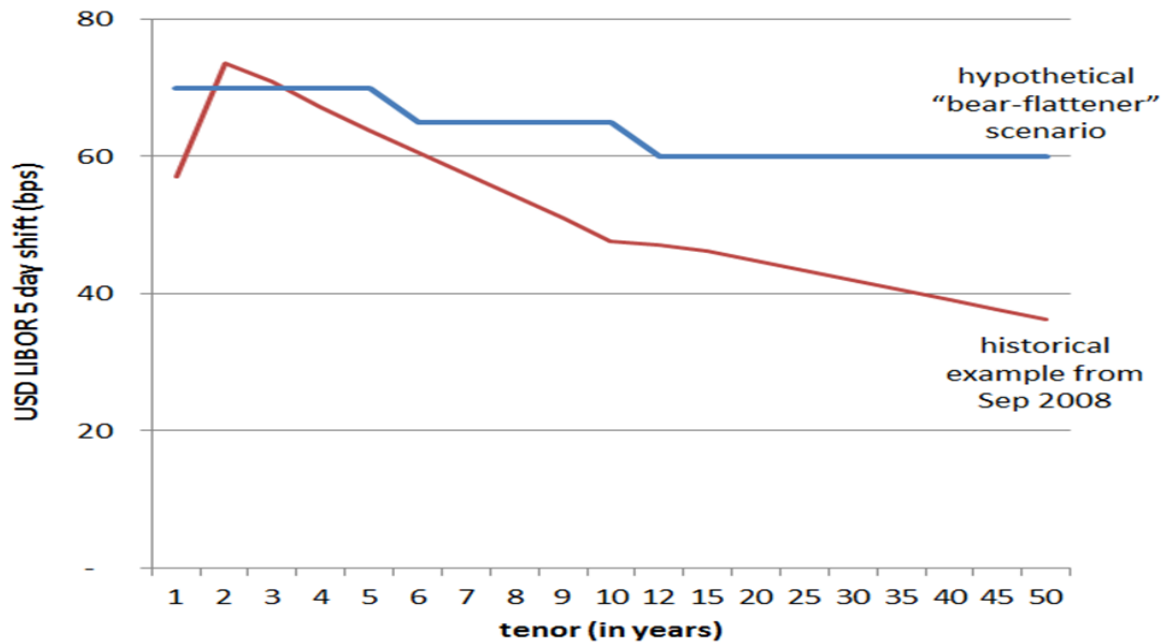
The goal was to identify the single scenario and pair of firms that best fit the following criteria. The losses had to be (i) very large in both asset classes, (ii) very large at all three clearinghouses, and (iii) proportionate to the relative sizes of the clearinghouses.

Staff then followed an iterative process to reduce the number of firms and scenarios under consideration. After reducing the number of potential scenarios to four and the number of potential clearing members to five, staff added futures stress test scenarios. In each case, the price movements in the futures scenarios were consistent with the price movements in the IRS scenarios to which they were added.

For IRS, staff eventually selected a hypothetical “bear-flattener” scenario. This is a situation where short term interest rates are increasing faster than long term interest rates, thus causing the yield curve to flatten. The specific scenario included upward shifts in the USD, LIBOR (London Interbank Offered Rate) curve of 70 basis points (bps) for maturities of 5 years and less, 65 bps for the middle tenors, and 60 bps at the far end of the curve.

For comparison, staff identified the largest five-day historical increase in IRS rates in the one to five-year tenor points using the past 20 years of data. (See Exhibit 4 below.) This historical scenario is one that was also considered, but the hypothetical scenario ultimately used resulted in greater liquidity needs.

Exhibit 4: Comparison of Two Alternative IRS Stress Test Scenarios



Corresponding one-day price moves were applied to interest rate futures. For other futures products, staff applied the same extreme price changes that were used in the applicable scenario from the 2016 exercise. For example, the S&P 500 was stressed up 15 percent. The largest daily increase in S&P 500 futures in the past 20 years was 14 percent.

The products included in this test settled in 16 different currencies. The currencies included: USD, EUR, GBP, CAD, AUD, JPY, CZK, HKD, HUF, MXN, NOK, NZD, PLN, SEK, SGD and ZAR. (See List of Acronyms for currency names).

D. Calculation of Losses

Staff calculated losses in a manner consistent with the treatment of accounts under CFTC regulations.³ For house accounts, gains and losses of affiliates were netted. For futures customer accounts, gains and losses across all accounts per futures commission merchant (FCM) were netted. For swap customer accounts, which are subject to LSOC requirements (legally segregated operationally commingled)⁴, staff calculated the sum

³ See CFTC regulation 1.3(y).

⁴ See CFTC regulations 22.1 - 22.17.

of the five largest individual customer losses at each defaulting firm. This is an extreme approach because it assumes that the five largest swap customers would default simultaneously. This has not occurred in the past and goes beyond what is required in the Commission's liquidity regulations.

Futures losses were all applied on Day 1. IRS losses were allocated over the five day margin period of risk as follows: Day 1 – 50%, Day 2 – 20%, Day 3 – 10%, Day 4 – 10% and Day 5 – 10%. This allocation is generally consistent with the principle that cumulative losses are proportional to the square root of time, except that it is slightly more front-loaded.

In calculating these losses, staff made two additional assumptions. Each of these assumptions was very conservative.

The first assumption is that there would be no hedging of the IRS positions in house account defaults. Thus, as noted, the stress test losses for Day 1 were assumed to be 50%, and Days 2 through 5 were assumed to be 50% of total stress test losses.

For comparison purposes, staff asked the DCOs that clear IRS to estimate the total costs if these portfolios had been hedged in this scenario. One DCO provided an estimate that the aggregate stress test loss of the hedged portfolio would be 45% lower than the unhedged portfolio. The other DCO indicated that the aggregate stress test loss would have been 32-42% lower.

The second assumption is that the default of these two firms and five customers at each would be completely unexpected by the DCOs. That is, there would be no prior evidence that either of these two firms or its customers were experiencing financial trouble. Past experience has shown that there would be some indication of the financial deterioration of the firms. In such circumstances the following would likely occur to lower the risk profiles of the firms:

- Customers might proactively transfer to another firm, with which they already have a relationship, potentially reducing the risk exposure of the firm.
- DCOs might require additional initial margin from the firms.
- The firms might require additional initial margin from the customers.
- In anticipation of liquidity needs, DCOs might delay the time in which they enter into reverse repurchase agreements. This could increase liquidity available to DCOs.
- DCOs could request the firms to decrease their risk exposures.

Upon completion of the analysis, staff sent the applicable stress test results, by currency, to each DCO. Each DCO independently confirmed that the calculations were accurate.

E. Review of Clearinghouse Liquidity Procedures

Each day, the CFTC receives extensive position and margin data. This enables staff to conduct credit stress tests at the individual account and clearing firm levels on a daily basis. By contrast, the CFTC does not routinely receive all the data that would be necessary to assess liquidity at DCOs with the same frequency.

Moreover, DCOs have options to choose from when generating liquidity and the CFTC would not be making those choices. Therefore, a necessary step in this exercise was for staff to send the results of the stress scenario to each clearinghouse and ask each one to explain in detail how the necessary liquidity would be generated if the specified clearing firms were to default under the specified circumstances.

The clearinghouses were instructed to assume that both firms defaulted at 8:00 am EST. However, LCH adopted a more stringent timeframe in its response, and assumed the default took place at 7:00 am UK time, giving it 6 hours less time to source liquidity.

Each DCO provided a detailed written response. Staff carefully reviewed the responses and all the documentation provided by the DCOs. Staff then held multiple meetings with each DCO to obtain answers to follow-up questions.

Staff then conducted interviews with three firms that had been identified by the DCOs as liquidity providers. The firms confirmed to staff that they would be able to enter into transactions with the DCOs to provide cash in the amounts and in the currencies required within the necessary timeframes. The two U.S. firms interviewed are primary dealers in the Treasury market and act as market-makers in the Treasury and FX markets.

Finally, staff reviewed data from independent third-party sources. Staff used this data to confirm the reasonableness of the DCOs' results.

III. Results

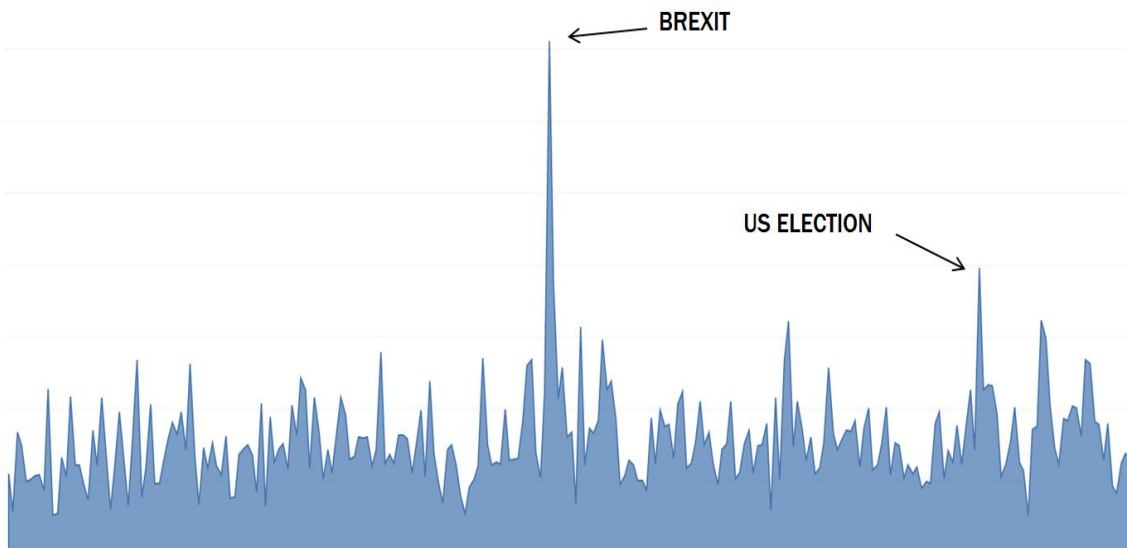
A. Use of Non-public Information

In conducting this exercise, staff made use of non-public information submitted by DCOs. Therefore, staff may not identify in this report the clearing firms whose positions generated the hypothetical stress losses. Nor can staff reveal the precise dollar amounts required under the stress test or identify the specific methods used by each DCO for generating liquidity. Nevertheless, staff believes that the aggregated information that is presented here provides evidence to support the conclusions.

B. Size of the Liquidity Demand

The aggregate stress test results created a liquidity demand from two firms across the three clearinghouses of \$13 billion. This is the equivalent of 59% of the aggregate variation margin (VM) paid by all firms to the DCOs included in the exercise on the day following the Brexit referendum. That day was the largest aggregate VM flow day in recent history. Exhibit 5 depicts how that day compared to typical days.

Exhibit 5: Daily Variation Margin in 2016



On the day after Brexit, the two firms which generated the largest pays accounted for only 21% of aggregate variation margin. Thus, this exercise created almost three times as much liquidity demand as would have been created if the two largest firms had defaulted following Brexit.

C. Clearinghouse Methods for Generating Liquidity

DCO 1

This DCO stated that it would have met the liquidity needs generated in this exercise by using cash from a maturing reverse repurchase agreement and by selling direct investments in short dated Treasury securities. Staff confirmed with the reverse-repurchase counterparties that the DCO regularly performed reverse-repurchase transactions for the amounts indicated by the DCO.

The DCO also has an understanding with the reverse-repurchase counterparties in which the counterparties agree to facilitate the selling of the direct investments. Staff discussed and confirmed this understanding with the counterparties. The counterparties also confirmed that the type and the amount of securities that needed to be sold could be easily handled by the market.

DCO 2

This DCO stated that it would meet its liquidity needs in a variety of ways depending on the specific currency. The DCO would access cash balances at a central bank, use cash from maturing reverse-repurchase agreements, enter into repurchase agreements using securities in the specific currency, and use larger exposure currencies to obtain cash through the foreign exchange (FX) spot market for smaller exposure currencies.

With respect to the reverse-repurchase agreements, the DCO had numerous counterparties. Therefore, if one failed to return the cash the following morning, the DCO would still have sufficient cash from the remaining counterparties. Staff confirmed with a reverse-repurchase counterparty that the DCO regularly performed reverse-repurchase transactions for the amounts indicated by the DCO.

With respect to repurchase agreements using securities in a particular currency to obtain cash in that currency, the DCO actually tested its ability to execute the repurchase agreement with eight counterparties. The DCO determined that it would have been possible to raise all of the cash with a single counterparty.

The DCO also tested its ability to exchange larger exposure currencies for smaller exposure currencies in the FX market. The DCO determined that it would not have to liquidate any of the defaulted firm's non-cash collateral to generate the cash liquidity.

For a variety of reasons, the complexity of the investments at this DCO was slightly greater than at the other DCOs. A liquidity analysis is performed by the DCO before determining the amount of cash to be invested each day in reverse-repurchase agreements.

DCO 3

This DCO stated that it would meet its liquidity needs by accessing the defaulting firm's cash on deposit and liquidating the defaulting firm's collateral as well as the collateral in some of the DCO's additional financial resources. The DCO provided staff with the specific type and maturity of securities to be liquidated.

As part of this exercise the DCO contacted two firms it would consider using to liquidate the collateral and shared the amount and types of collateral to be liquidated. The DCO stated that, based on those discussions and its own experience, it believes the collateral could be liquidated for same-day cash within an hour or two.

Staff also discussed the liquidation of the collateral with a liquidity provider. The liquidity provider stated that the normal practice is next-day settlement, but same-day settlement for cash is not a problem and that it does not necessarily mean the DCO would get a worse price.

Using Bloomberg data, staff estimated that the costs to liquidate this DCO's largest Treasury securities would be 1-1.5 bps under normal circumstances. However in a stressed market the cost would depend largely on the dealer's ability to liquidate in a short time frame, and could differ from the prevailing bid-ask spread. Even so, the liquidation cost would likely be small relative to the haircut, which is designed to protect against significant market movements.

The liquidity provider stated that the first step to begin liquidation of the collateral would be for the DCO to provide immediate notice that it has ownership of the securities and intent to sell. The DCO would inform the buyer of the securities where the securities were located and could gain some efficiency if it could move the securities

to an account in the DCO's name affiliated with the buyer prior to the transaction. If the liquidity provider's institution can locate the securities in an affiliated account, an interbank DVP (delivery versus payment) transaction can occur or a DVP transaction can occur between the DCO's institution where the securities are located and the buyer's institution. The DCO would work with the liquidity provider to monitor the securities sold and remaining to be sold. The DCO would then wire funds to a settlement bank in which it had a payment obligation.

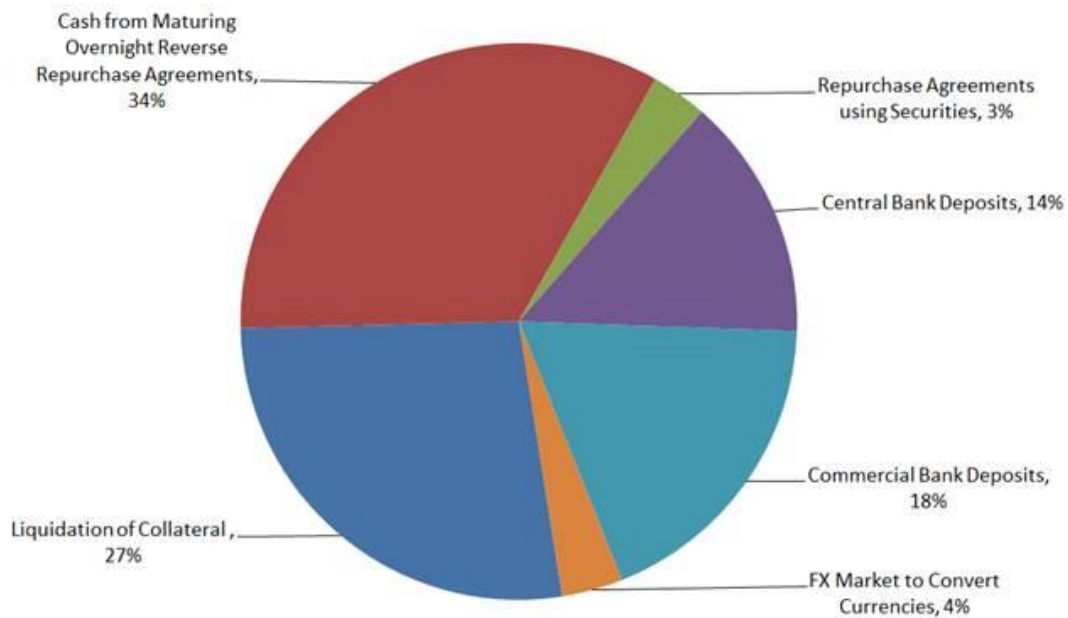
This DCO also used larger exposure currencies to obtain cash through the FX market for smaller exposure currencies.

In instances where the DCO invested in various reverse-repurchase agreements that matured at different times across multiple time zones, staff confirmed with the DCO that amounts available for liquidity included only cash that would be available at the time of the defaults.

D. Summary of Methods Used by Clearinghouses

Exhibit 6 summarizes the methods DCOs chose to generate liquidity in this exercise.

Exhibit 6: Sources of Liquidity in this Exercise



In their submissions, DCOs provided documents illustrating the types of data used, and analysis conducted to help determine the preferred method of meeting liquidity needs in this default scenario.

Data included collateral on deposit by type and currency in the defaulted accounts. Analysis included projections of liquidity needs by currency and account over a five day period, along with assets available to meet these needs.

E. Effects across Clearinghouses

A goal of this exercise was to determine if any combination of the three DCOs would have the need to access the same source of liquidity and, if so, what effect that might have on the liquidity provider(s) and the market in general. The analysis below discusses the different types of liquidity that would be used by the DCOs and discusses whether two or more DCOs would have used the same method.

Futures related defaults were denominated in USD only, while the IRS defaults encompassed multiple currencies. Much of the required liquidity was met with cash on hand in the form of commercial bank and central banks deposits or cash inflows from maturing repurchase agreements. DCOs were not relying on executing multiple transactions per currency to meet their liquidity needs. In no instance was more than one transaction per currency required to obtain the liquidity.

With the exception of some small FX transactions, that would have occurred after Day 1, all requirements for Days 2 through 5 were available on Day 1. No additional liquidity transactions were required for Day 5.

Cash from maturing reverse-repurchase agreements was a source of liquidity relied upon by more than one DCO. In the normal course of a maturing reverse-repo, the DCO would return the securities involved in the transaction to the counterparty and receive the cash back, or roll-over at the current market rate. The fact that such transactions might be performed by multiple DCOs, therefore, should not have a systemic effect on liquidity.

Liquidating collateral was a source of liquidity relied upon by more than one DCO. Staff interviewed firms that the DCOs would contact to facilitate the liquidation of collateral. The same liquidity provider could be used by two DCOs to liquidate collateral. Staff consulted with the identified liquidity providers and made a determination that the

collateral amounts were such that the providers would be able to meet the needs of the DCOs for same day funds without disrupting the market.

In this regard, staff reviewed statistics of turnover in the markets for U.S. Treasury securities. The Treasury securities that these DCOs would have liquidated in this scenario represent less than 1% of average daily trading volume in those markets.⁵ Thus, although the volume of securities liquidated in this exercise would be extremely large from the perspective of normal practice at the DCOs, this volume would not be systemically significant from the perspective of the overall market for U.S. Treasury securities.

Moreover, DCOs routinely apply haircuts to collateral including Treasury securities. Staff took these into consideration in assessing the ability of DCOs to raise funds by liquidating such collateral.

Because the amounts of FX on deposit with the DCOs were insufficient to meet payment obligations to firms, more than one DCO went into the FX market to obtain specific currencies. The level of activity involved here was extremely small in relation to the size of the FX markets.

Finally, for two of the DCOs, the defaulting firm or an affiliate was a potential liquidity provider. For one DCO, the two firms/affiliates were liquidity providers in a resource that was not used to generate liquidity for this exercise and, therefore, their default did not affect the DCO's ability to access liquidity.

For the second DCO, the two firms were existing reverse-repurchase counterparties. As defaulted members, the securities posted by the firm as collateral for any reverse-repurchase agreement would become available for liquidation. In any case, for purposes of this exercise, the DCO had sufficient cash from other sources to meet its obligations under the scenario.

In fact, all three DCOs would have had sufficient liquidity to cover substantially more than the amounts required in this exercise. Each of the DCOs had alternative methods of obtaining liquidity that weren't tapped here. These include for one or more DCOs: (i)

⁵ See page 14 of the latest Treasury report available at <https://www.treasury.gov/press-center/press-releases/Documents/A-Financial-System-Capital-Markets-FINAL-FINAL.pdf>

additional maturing reverse repos, (ii) additional collateral available for liquidation, (iii) DCO capital, and (iv) secured lines of credit.

IV. Conclusions

The results of this exercise demonstrate that these clearinghouses had sufficient funding liquidity to meet the variation payments resulting from defaults by two very large firms and, as applicable, the five largest customers from each firm. This was accomplished despite the fact that simulated defaults occurred simultaneously across all clearinghouses included in the exercise.

The methods relied upon to raise cash overlapped among the clearinghouses to some extent. The extent of the overlap, however, did not appear to present any systemic risk concerns.

Some observers have expressed concern about liquidity risk at DCOs. The findings from this exercise provide evidence that could serve to mitigate these concerns to some extent. However, continued vigilance through active monitoring and future stress tests will be an essential part of the ongoing CFTC supervisory programs.

V. Next Steps

As noted at the outset, this exercise is the second in a series of systemic stress tests involving derivatives clearinghouses. CFTC staff intends to continue to enhance its program to incorporate additional scenarios and sources of risk. The Next Steps section of the November 2016 Report listed a number of enhancements. One of them was liquidity risk, a risk factor examined in this exercise. Other enhancements listed included adding scenarios, adding products, and doing reverse stress tests. This exercise also included additional yield curve shifts in the stress scenarios.

In its plans for future stress tests, staff plans to expand the scope of the exercises to include other risk factors.

- Specifically with regard to funding liquidity risk, staff plans to design an exercise that addresses liquidity needs at the firm and account levels. It would include an analysis of at least the following areas:
 - issues, if any, on making variation payments across multiple time zones;

- the extent to which clearing firms generally advance funds to customers to meet variation payments in the customer origin;
 - issues, if any, on intra-day settlement cycles; and
 - the frequency and size of initial margin calls.
- Another area that will be addressed in a future exercise is trading liquidity. Such an exercise would look at issues related to hedging, auctioning, and porting complex portfolios of a large number of customers in the event of a default by a very large clearing member.
- Operational risk is another area of serious concern. A future exercise will address the effects of a system failure at a clearinghouse or a service provider.
- The failure of a settlement bank, whether for operational or financial reasons, could have serious consequences. A future exercise will include that scenario.

Finally, staff is actively working on automating its processes for conducting these exercises. The goal is to enable staff to conduct them much more frequently. It will also enable staff to combine more than one of these types of risk into a single exercise. Another benefit of more frequent exercises will be to allow staff to conduct analyses of trends within individual clearinghouses and across the industry.