Fixed Income Clearing Corporation: Government Securities Division

OVERVIEW OF THE CLEARING FUND METHODOLOGY FOR GSD

VERSION 2.2

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1. EXECUTIVE SUMMARY

The Government Securities Division ("GSD"), a division of the Fixed Income Clearing Corporation ("FICC")[1], is the leading provider of trade comparison, netting and settlement for the U.S. Government securities marketplace.

A key tool that FICC uses to manage market risk is the daily calculation and collection of Required Fund Deposits from Netting Members.[2] The Required Fund Deposit serves as each Netting Member's margin. The aggregate of all Netting Members' Required Fund Deposits, and all other deposits, including Cross-Guaranty Repayment Deposits, constitutes the Clearing Fund of GSD, which FICC would access should a defaulting Netting Member's own Required Fund Deposit be insufficient to satisfy losses to FICC caused by the liquidation of that Netting Member's portfolio. In addition, GSD calculates a mark-to-market which is intended to reflect the realized profit and loss of the Netting Member's positions resulting from actual changes in market prices. The mark-to-market calculation is part of the Funds-Only Settlement Amount ("FOS") and will only be addressed in this document with respect to required times for payment.

The purpose of this document is to provide an overview of the components that comprise a Netting Member's Required Fund Deposit. The Required Fund Deposit is collected to cover potential changes in the value of each Netting Member's position over the assumed liquidation/hedging period in the event that such Netting Member defaults.[3]

[1] FICC is a subsidiary of The Depository Trust and Clearing Corporation ("DTCC").

[2] Capitalized terms used herein and not defined shall have the meaning assigned to such terms in the GSD Rulebook ("GSD Rules") available at www.dtcc.com/legal/rules-and-procedures.

[3] The three-day liquidation period is sometimes referred to as the "margin period of risk" or "closeout-period." This period reflects the time between the most recent collection of the Required Fund Deposit from a defaulting Netting Member and the liquidation of such Netting Member's portfolio. FICC currently assumes that it would take three days to liquidate or hedge a portfolio in normal market conditions.

2. THE GOVERNMENT SECURITIES DIVISION

GSD provides trade comparison, netting and settlement for the U.S. Government securities marketplace. GSD clears the following securities and transaction types:

- Buy-sell transactions in eligible U.S. Treasury and agency securities.
- Delivery versus Payment ("DVP") repurchase agreement ("Repo") transactions whereby the underlying collateral must be U.S. Treasury or agency securities.
- GCF Repo® Transactions whereby the underlying collateral may be U.S. Treasury securities, agency securities or eligible mortgage-backed securities ("MBS"). Unlike DVP Repo transactions, the underlying collateral for GCF Repo Transactions is not specified until the end-of-day[4] which is when the actual individual securities are allocated.
- Sponsored GC Trades, in connection with the Sponsored GC Service, are Sponsored Member Trades that are Repo Transactions between a Sponsored Member and its Sponsoring Member whereby the underlying collateral may be U.S. Treasury securities, agency securities or eligible MBS. Within the Sponsored GC Service is the Collateral-in-Lieu ("CIL") Service[5], allowing a Sponsoring Member to submit a Sponsored GC Trade between its Sponsored Member and either a Netting Member other than the Sponsoring Member or another Indirect Participant of any Netting Member.

[4] See SCHEDULE OF GCF TIMEFRAMES in GSD Rules for specific deadlines.

5 Under the CIL Service, a Sponsoring Member is eligible to submit to FICC for clearance and settlement a repurchase transaction ("Sponsored GC CIL Trade") entered into by its Sponsored Member as cash provider ("CIL Funds Lender") with the Sponsoring Member or with another Netting Member or any Netting Member's Indirect Participant and for such transaction to settle through the tri-party platform operated by a Sponsored GC Clearing Agent Bank.

3. THE REQUIRED FUND DEPOSIT AND CLEARING FUND CALCULATIONS

3.1 Overview

The Required Fund Deposit is calculated and collected to cover the risk associated with liquidation of a Netting Member's portfolio in the event of such Member's default. GSD calculates Required Fund Deposits and FOS twice each business day based on a Netting Member's 12:00p.m. and end-of-day positions. Required Fund Deposit deficits are collected at 2:45p.m. on the current day and 9:30a.m. on the next business day, respectively.[6] Separately, FOS is collected and passed through directly to Netting Members twice each business day (i.e., at 4:30p.m. based on a Netting Member's noon positions and 10:00a.m. the next business day based on a Netting Member's prior end-of-day positions).

Through a number of risk-based charges, the Required Fund Deposit addresses a Netting Member's potential market risk exposure. Of these components, the VaR Charge generally comprises the largest portion of a Netting Member's Required Fund Deposit amount. Market risk is measured based on positions and marketvolatilities. Positions, as input into the risk calculation, are collected into portfolios for the Clearing Fund calculations. Market volatilities are captured by statistics based on historical market conditions.

3.2 Portfolio Based Risk Calculation

Each Netting Member has one or more GSD Accounts used for settlement purposes. With respect to margin calculations, Netting Members are allowed to group Accounts under the same legal entity and Permitted Margin Affiliates[7] into one or more Margin Portfolios, in each case, subject to certain restrictions and limitations.[8] Required Fund Deposit amounts are calculated based on the positions in each Margin Portfolio. This can potentially reduce the Required Fund Deposit due to netting effect and diversification across positions held in a Netting Member's and it's Permitted Margin Affiliates' different Accounts when combined in a Margin Portfolio.

Unless otherwise noted, the Required Fund Deposit and Clearing Fund calculations in this document are based on Margin Portfolios.

3.3 Components of the Required Fund Deposit

GSD calculates and collects two margin requirements - one is based on a Netting Member's intraday 12:00p.m. positions and the other is based on such Netting Member's end-of-day positions. The following table summarizes the components of the Required Fund Deposit calculation based on a Netting Member's intraday and end-of-day positions.

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[6] All times referenced herein refer to New York City time.

[7] The term "Permitted Margin Affiliate" means an affiliate of a Netting Member that is also a member of GSD and that directly or indirectly controls such particular Member, or that is directly or indirectly controlled by or under common control with such particular Member. Ownership of more than 50% of the common stock of the relevant entity (or equivalent equity interests in the case of a form of entity that does not issue common stock) will be conclusively deemed prima facie control of such entity for purposes of this definition. GSD Rule 1, Definitions.

[8] For example, a Dealer Account and a Broker Account cannot be grouped into the same portfolio, even if both Accounts belong to the same Netting Member or a Permitted Margin Affiliate. GSD Rule 4, Section 1a, Margin Portfolio.

Component	Risk Addressed	GSD Portfolio Margin Method
VaR Charge	Market risk of the observed positions	The VaR Charge is calculated using a risk based margin methodology that is intended to capture the market price riskassociated with the securities in a Netting Member's Margin Portfolio over a designated time-period. VaR Charge is calibrated to cover the projected liquidation losses at a 99% confidence level, assuming a 3-day liquidation/hedging period.[9] FICC uses historical simulation to estimate the impact of market volatilities on the Netting Member's Margin Portfolio(s). Simulated returns are based on risk sensitivities obtained from a third party and relevant risk factor time series ("sensitivity based approach"). A ten-year historical look-back is used if it includes sufficient stressed market scenarios. If, however, FICC determines that the historical look-back period does not contain adequate shocks, additional period(s) of stressed market conditions may be added to the ten-year historical data. A haircut method is applied to securities with insufficient requisite data used to employ the sensitivity approach. Pursuant to the CME Cross-Margining Arrangement betweenFICC and the Chicago Mercantile Exchange ("CME") [10], FICC and CME separately calculate the potential margin reduction resulting from offsetting positions in a common member's portfolio using their respective margin methodologies and agree to reduce the member's margin requirement by the more conservative amount (i.e., the smaller reduction). The total VaR Charge of a Netting Member's Margin Portfolio is the sum of the volatility model calculation (including cross margin reduction where applies) and haircuts, subject to minimum amount, referred to as the "VaR Floor." The term "VaR Floor" means, with respect to each Margin Portfolio, the greater of (i) the VaR Floor Percentage Amount and (ii) the Minimum Margin Amount. VaR Floor Percentage Amount is determined by multiplying the absolute value of the sum of Net Long Positions and Net Short Positions of Eligible Securities, grouped by product and remaining maturity, by a percentage designated by FICC from time to time for such group. The VaR Floor is reviewed from time to time, generally, at least annually, and updated in accordance with FICC's internal model governance process.

9 The three-day liquidation period is sometimes referred to as the "margin period of risk" or "closeout-period." This period reflects the time between the most recent collection of the Required Fund Deposit from a defaulting Netting Member and the liquidation of such Netting Member's portfolio. FICC currently assumes that it would take three days to liquidate or hedge a portfolio in normal market conditions.

10 Currently, Cross-Margining Participants are Netting Members that participate in the Cross-Margining Arrangement between FICC and the Chicago Mercantile Exchange (the "CME"). See GSD Rule 1, Definition.

Component	Risk Addressed	GSD Portfolio Margin Method
Minimum Margin Amount	Market risk of the observed positions	The Minimum Margin Amount ("MMA") is used to supplement the VaR Floor in order to improve its responsiveness and resilience to extreme market volatility. MMA is recalibrated to current market conditions using a filtered historical simulation ("FHS") approach to assess volatility by scaling historical market price returns to current market volatility.
Bid-Ask Spread Charge	Market risk of the observed positions	The Bid-Ask Spread Charge is included in the VaR Charge to cover the transaction cost to liquidate a portfolio. The charge is segmented into six classes by product type and/or maturity and a specific haircut rate is applied to each class. 1. TSY maturing in less than 5 years (including Treasury bonds with remaining maturities less than 5 years, excluding TIPS); 2. TSY maturing in 5 years or more, but less than-10 years (including Treasury bonds with remaining maturities between 5 years or more, but less than 10 years, excluding TIPS); 3. TSY maturing in 10 years or more (including Treasury bonds with remaining maturities 10 years or more, excluding TIPS); 4. Agency (including all Agency bonds); 5. TIPS (including all TIPS bonds); 6. All mortgage-backed securities.
Portfolio Differential	Portfolio Variability Risk	The Portfolio Differential ("PD") Charge is designed to capture variability in the VaR Charge collected from the Member over the look back period. The PD Charge is calculated twice each Business Day as the exponentially weighted moving average ("EWMA") of the historical increases in the Member's VaR Charge that occurs between collections of Required Fund Deposits over a lookback period of no less than 100 days with a decay factor of no greater than 1, times a multiplier that is no less than 1 and no greater than 3, as determined by the Corporation from time to time based on backtesting results.
Margin Liquidity Adjustment Charge	Concentration Risk	The Margin Liquidity Adjustment ("MLA") Charge is only assessed when the Member's Margin Portfolio exceeds a threshold in comparison to the available market liquidity of the market segment. GSD segments the relevant markets into four asset groups: 1) U.S. Treasury securities (excluding TIPS), 2) TIPS, 3) U.S. agency bonds, and 4) mortgage pools transactions.

Component	Risk Addressed	GSD Portfolio Margin Method
		The asset group of Treasury security is further divided into five tenor buckets: i) securities with remaining maturities less than one year; ii) securities with remaining maturities equal to or more than one year and less than two years; iii) securities with remaining maturities equal to or more than two years and less than five years; iv) securities with remaining maturities equal to or more than five years and less than ten years; v) securities with remaining maturities equal to or more than ten years. The TIPS asset group is further divided into four tenor buckets i) TIPS with remaining maturities less than two years; ii) TIPS with remaining maturities equal to or more than two years and less than six years; iii) TIPS with remaining maturities equal to or more than six years and less than eleven years; iv) TIPS with maturities equal to or more than eleven years.
Blackout Period Exposure Adjustment	Market risk	This charge is only applicable to transactions collateralized with MBS. An additional charge or reduction that may be added to applicable Members' VaR Charge to mitigate exposures to FICC that may arise due to potential overvaluation of transactions collateralized with MBS during the Blackout Period.
BacktestingCharge	Model risk	An additional charge that may be added to a Netting Member's or Segregated Indirect Participant's VaR Charge to mitigate exposures to FICC caused by settlement risks that may not be adequately captured by FICC's portfolio volatility model. FICC may assess this charge on a Netting Member's or Segregated Indirect Participant's start of day Margin Portfolios and/or its intraday Margin Portfolios.
Volatility Event Charge	Risk related to adverse market volatility arising from scheduled events	The Volatility Event Charge is an additional charge that may be added to a Member's Required Fund Deposit during designated coverage period(s) to mitigate FICC's exposures to market volatility that may arise from a scheduled event. The Volatility Event Charge is calculated by applying a multiplier to each margin portfolio's VaR Charge.

Component	Risk Addressed	GSD Portfolio Margin Method
Holiday Charge	Risk related to trading activity on a Holiday	An additional charge that may be added to Netting Members' VaR Charge on the Business Day prior to a Holiday.
Clearing Fund Premiums and Special Charges	To address compliance issues or mitigate perceived risks in excess of those systematically addressed via components referenced above	**Collateral Premiums:** the greater of $1 million or 25% of the Netting Member's Required Fund Deposit. **Excess Capital Premium:** equal to the Netting Member's Excess Capital Differential multiplied by its Excess Capital Ratio. **Special Charges:** additional deposit to mitigate specific risksthat may arise from time to time.

For the Intraday Supplemental Fund Deposit, the VaR Charge is computed from the simulated profit and loss (P&L) scenarios that are calculated with the relevant intraday position. For the Intraday Mark-to-Market Charge ("IMTM"), the charge is calculated based on increases in mark-to-market exposure that occur between the collections of the Funds-Only Settlement Amount or IMTM.

The entire Required Fund Deposit will be the greater of the sum of these charges, or the Minimum Charge, which varies depending on membership type. The Minimum Charge applicable to each Netting Member, other than a Repo Broker, shall be no less than $1 million. The Minimum Charge applicable to each Repo Broker shall be no less than $5 million for each Margin Portfolio with Broker Account(s) and no less than $1 million for each Margin Portfolio with Dealer Account(s).[11] Once applicable Minimum Charges have been applied, the Corporation shall apply any applicable additional payments, charges and premiums set forth in these Rules.

[11] GSD Rule 4, Section 2, Required Fund Deposit Requirements.

4. VAR METHODOLOGY

GSD uses a value-at-risk ("VaR") historical simulation approach to calculate the price volatility within its Required Fund Deposit. VaR is a widely used risk management concept in the financial industry. In its simplest form, VaR provides an estimate of the possible losses for a given portfolio based on a given confidence level over a particular time horizon. It is intended to cover the uncertainty of market volatility for any given portfolio. For example, if a 3-day VaR calibrated to a 99% confidence level is $10,000,000, it means that there is a 99% chance that the 3-day liquidation loss won't exceed $10,000,000.

The total VaR Charge of a Netting Member's Margin Portfolio is the sum of the VaR model calculation andhaircuts, subject to minimum amount, referred to as the "VaR Floor."

Summarized below is an overview of the methodology that GSD uses to compute the VaR Charge.

4.1 Historical Simulation

To measure the risk of a Margin Portfolio, it is necessary to project the potential value changes of the portfolio. Various techniques are available to project value changes in a portfolio and GSD has chosen a historical simulation approach.

As mentioned above, GSD's VaR Charge is generally computed based on the confidence level of 99% and the assumption of 3-day liquidation/hedge period. For a fixed end of day or intraday Margin Portfolio, this requires a sample of the possible P&Ls in 3-day periods. A general technique is to use the 3-day returns of selected instruments over a predetermined time interval, for example, ten years, thus producing 2500 returns for each instrument. The historical returns can then be applied to the Margin Portfolio containing these instruments to calculate a P&L for each of the 2500 historical days. In effect, it applies the historical market conditions of each of the past 2500 days to the current Margin Portfolio to simulate 2500 Margin Portfolio P&Ls. The 2500 P&Ls are then sorted and a VaR with a 99% confidence level is the 1st percentile of the losses. Historical simulation is appealing because it uses actual and observable historical data. Also,it does not make any specific assumption on the underlying P&L distribution. However, all models carry certain assumptions behind them. The basic assumption that GSD makes is that the past ten years of market movement is sufficient to adequately measure the worst 99th percentile movement over the next three business days.

If, however, GSD determines that the historical look-back period does not contain adequate shocks, additional period(s) of stressed market conditions can be added to the ten years of historical data. GSD wouldutilize its standard model governance process to determine whether to apply the stressed historical VaR for margining purposes and the appropriate historical stressed period to incorporate. The historical stressed period chosen for the historical stressed VaR would be consistent with the historical stress scenarios applied to GSD in DTCC's stress test.[12]

[12] At the time of implementation, the 10-year look-back period included the 2008/2009 financial crisis scenario. To the extent that an equally or more stressed market period does not occur when the 2008/2009 financial crisis period is phased out from the 10-year look-back period (i.e., from September 2018 onward), FICC would continue to include the 2008/2009 financial crisis scenario in its historical scenarios. However, if an equally or more stressed market period emerges in the future, FICC may choose not to augment its 10-year historical scenarios with those from the 2008/2009 financial crisis. The stressed period, if added to the look-back period, shall be no shorter than 6 months and no longer than 36 months, and comprised of either one continuous period specified by a start date and an end date or comprised of more than one non-continuous period. It is currently set at 18 months covering a period from January 2008 through June 2009.

As an example, consider the following example Margin Portfolio that contains three securities in July 2017:[13]

Security	Market Price	Par	Description
912828XW5	99.629	$2,000,000	5 year U.S. Treasury note with 1.750%coupon maturing in June 2022
912828XX3	98.668	-$1,000,000	7 year U.S. Treasury note with 2.000%coupon maturing in June 2024
01F040677 (3138WFH66)	106.4	$1,000,000	30-year Fannie Mae Single Family with 4% coupon

GSD computes 2500 days of simulated P&L returns using vendor supplied data and the positions in the Margin Portfolio.[14] The last column is the total simulated P&L for the Margin Portfolio, which is the sum of simulated P&Ls of the three CUSIPs. The following table gives simulated results.

SimulationDay	912828XW5	912828XX3	01F040677	Margin PortfolioP&L
1	1,000.31	(647.70)	103.01	455.62
2	566.63	(1,604.25)	20.50	(1,017.12)
3	(2,003.14)	1,391.35	(1,025.60)	(1,637.39)
...	...	...		...
2498	(3,160.33)	976.54	(200.00)	(2,383.79)
2499	(3,012.69)	572.73	(68.25)	(2,508.21)
2500	824.00	(2,597.78)	(58.85)	(1,832.63)

The next step is to sort the "Margin Portfolio P&L" column and find the first percentile of the simulated losses (100% minus 99%, for a 99% confidence level). The sorted results are show below.

Sorted Order	Simulation Day	Simulated P&L			Margin Portfolio P&L
		912828XW5	912828XX3	01F040677	
2500	131	(7,456.00)	1,317.00	(1,139.00)	(7,278)
...	...	...	...	...	...
2476	980	(6,010.00)	143.00	(501.00)	(6,368)
2475	2220	(2,545.00)	(2,400.00)	(991.00)	(5,936)
...	...	...	...	...	...
1	1890	473.00	5,257.00	50.00	5,780

[13] This example is for illustrative purposes only.

[14] See section 4.2 for further discussion the calculation of returns.

The 99% VaR based on the 2500 returns summarized in the table above is then calculated through interpolation.

Denote N = 2500 for the sample size and α = 99 for the confidence level.

Let $k = floor\,(0.01(N+1)\,\alpha) = 2{,}475$, and $d = 0.01(N+1)\,\alpha - k = 0.99$.

We have $r_k = r_{2475} = -5{,}936$, and $r_{k+1} = r_{2476} = -6{,}368$

Then, $VaR = -\big(r_k + d(r_{k+1} - r_k)\big) = -\Big(-5{,}936 + 0.99 * \big(-6{,}368 - (-5{,}936)\big)\Big) = \mathbf{6{,}363.68}$

The VaR Charge for the Margin Portfolio is $6,363.68.

4.1.1 Risk P&L Model

In order to obtain the simulated returns used in the VaR model calculation, GSD uses a sensitivity approach, where the risk profile of a Netting Member's Margin Portfolio is decomposed and represented by the behaviors of key market risk drivers ("factors"), such as changes in interest rates.

A Netting Member's Margin Portfolio will consist of U.S. Treasury/agency securities and/or MBS thus the risk factors selected by GSD to explain the price changes are slightly different for each product. For U.S. Treasury and agency securities, the following risk factors have been incorporated: key rates, convexity, agency spread, implied inflation, volatility, and time. For MBS,[15] GSD uses risk exposure analytics of to-be-announced ("TBA") securities as a proxy for the MBS risk exposure analytics. Therefore, MBS are mapped to TBAs and the risk factors are the same as those used by FICC's Mortgage-Backed Securities Division ("MBSD") VaR model, but with an additional risk factor to account for the basis risk between the MBS and the mapped TBA proxy.

The value change of a Margin Portfolio is approximated by multiplying the change of the selected risk factors under various scenarios by the magnitude of the Margin Portfolio's reaction (i.e., the sensitivity) to the change.

More specifically, a position's P&L is estimated by the sum-product of the risk exposures and the corresponding risk factor returns.

Risk exposure measures the change of a Margin Portfolio's value to the change of a risk factor. The exposure of a position in security *j* of the Margin Portfolio to the *i*-th risk factor can be shown as:

$$E_{ij} = MV_j * S_{ij} * multiplier_i$$

Here, we assume a Margin Portfolio has N number of securities, and one of them is the security *j*, which has a market value of MV_j, and the sensitivity of security *j* to the *i*-th risk factor is S_{ij}. The multiplier is static and driven by how the risk sensitivity is quoted and how the risk factor change affects the P&L.

Margin Portfolio level exposures are calculated by aggregating position level risk exposures. Assuming N securities in a Margin Portfolio, the exposure of the portfolio to the *i*-th risk factors will be:

$$EE_{ii}^{PP} = \sum_{j=1}^{N} (MV_{jj} * S_{ij} * multiplier_i)$$

EE_{ii}^{PP} constitutes the exposure vector of the Margin Portfolio P, which contains the exposure of the portfolio to each risk factor.

[15] As noted above, MBS enter a Netting Member's Margin Portfolio as collateral of GCF Repo Transactions.

For example, consider the Margin Portfolio in the prior section with three positions: 5 year U.S. Treasury note maturing in June 2022 (912828WS5), 7 year U.S. Treasury note maturing in June 2024 (912828XX3), and a GCF Repo Transaction collateralized with a MBS.

		(MV)	(S)	(M)	E=(S*MV*M)
CUSIP	**Factor Name**	**Market Value**	**Sensitivity**	**Multiplier**	**EXPOSURE**
912828XW5	Key Rate (5yr)	2,000,000	0.4147	-1	**-829,400**
912828XX3	Key Rate (5yr)	-1,000,000	0.27339	-1	**273,390**
01F040677	Key Rate (5yr)	1,000,000	0.22000	-1	**-220,000**

Each product's sensitivity to a change in the 5yr rate, and the multiplier (which is based on the way the sensitivity is quoted and the impact it has on the value change) are shown above. The risk exposure provides an estimate of how the Margin Portfolio's market value will change as a result of a change to the 5yr rate.

Using the risk exposure calculated above, the simulated P&L, ΔMV_p, is calculated at the Margin Portfolio level as:

$$\Delta MV = \sum_{i=1}^{M} E_i^P \times FR_i$$

Where M is the numbers of risk factors and FR_i is the factor return of the i-th factor.

To continue the example of the sample Margin Portfolio above, if the factor for the 5yr rate is changed as shown below, the market value change attributable to the move in the 5yr would be $6,176.66:

		(E)	(FR)	Scenario Date SPnL=E*FR
TBA CUSIP	**Factor Name**	**EXPOSURE**	**Factor return**	**Simulated P&L**
912828XW5	Key Rate (5yr)	**-829,400**	-0.0187427	**15,545.20**
912828XX3	Key Rate (5yr)	**273,390**	-0.0187427	**-5,124.07**
01F040677	Key Rate (5yr)	**-220,000**	-0.0187427	**4,123.40**
				14,544.53

Additional risk factors give a more complete picture of the simulated market environment and its influence on the value of the Margin Portfolio. The Margin Portfolio market value change is simulated by multiplying observed historical shocks of the selected risk factors over three days against the sensitivity of the current Margin Portfolio to each risk factor.

As noted above, for U.S. Treasury securities and agency securities, FICC would select the following risk factors: key rates, convexity, agency spread, implied inflation rates, volatility, and time. For MBS, each security would be mapped to a corresponding TBA forward contract and FICC would use the risk exposure analytics for the TBA as an estimate for the MBS's risk exposure analytics. FICC would use the following risk factors to model a TBA security: key rates, convexity, MBS spread, volatility, mortgage basis, and time. To account for differences between MBS and their corresponding TBA, FICC would apply an additional basis risk adjustment.

4.2 Haircuts

Occasionally, Margin Portfolios contain classes of securities that reflect market price changes not consistently related to historical risk factors. In order to help ensure that all positions are accounted for in measuring the portfolio's risk, GSD will apply a haircut method to calculate the risk exposure for classes of securities that have market price changes that are not consistently related to historical risk factors due to varying market volumes.

The haircut charge for each GSD Margin Portfolio consists of the four components explained in each of the following sub-sections. The total haircut is the sum of the following four components.

4.2.1 U.S. Treasury and Agency bonds without sensitivity analytics data

U.S. Treasury or agency securities[16] that have insufficient data to be incorporated into the sensitivities approach are each mapped to a benchmark U.S. fixed income index, based on the security's asset class and remaining maturity, and then all securities within each benchmark wouldbe aggregated into a net exposure. FICC then applies an applicable haircut to the net exposure per benchmark to determine the net price risk for each benchmark. The haircut assessed for this portion of the Netting Member's Margin Portfolio is then calculated from a joint correlation matrix and the net price risk of each benchmark. The correlation matrix is applied to provide risk diversification across tenor buckets that were historically observed.

The haircut rates and correlation parameter are calibrated using historical 3-day returns of the indices during the 10 years of look-back period.

The correlation adjustment is based on 3-day returns during a 10-year look-back. It reflects the average amount that the 3-day returns of each benchmark moves in relation to one another. The correlation adjustment would only be applied for U.S. Treasury and agency indices with maturities greater than 1 year.

4.2.2 MBS without sensitivity analytics data

MBS with insufficient information to be incorporated into the sensitivity approach are mapped into the TBA benchmarks and the haircut charge for this MBS portion of the Netting Member's Margin Portfolio is assessed as described below.

Risk factors are calculated using historical market prices of benchmark TBA securities and each Netting Member's Margin Portfolio exposure would be calculated on a net position across all MBS products and for each securitization program (i.e., Federal National Mortgage Association ("Fannie Mae") and Federal Home Loan Mortgage Corporation ("Freddie Mac") conventional 30-year MBS,Government National Mortgage Association ("Ginnie Mae") 30-year MBS, Fannie Mae and Freddie Mac conventional 15-year MBS, and Ginnie Mae 15-year MBS). The haircut for the MBS portionof the Netting Member's Margin Portfolio is then calculated by multiplying the Outright risk factor, which is the dominantand most liquid portion of the products cleared by FICC, by the absolute value of the Netting Member's net position across all MBS products, plus the sum of each spread risk factor for the other MBS programs to the outright risk factor multiplied by the absolute value of its corresponding position.

4.2.3 U.S. Treasury FRN Haircut Charge

For FRN securities, FICC adopted a haircut approach that uses a constant discount margin movement scenario. This discount margin movement amount is based on the current market condition of the FRN

[16] This haircut does not apply to (x) floating rate notes ("FRN") and (y) term repo rate volatility for term repo transactions and forward-starting repo transactions, which are subject to separate approaches described below.

price movements. This amount, combined with the calculated discount margin sensitivity of each FRN issue's market price and the US Treasury provided formula, determines the haircut charge of the FRN portion of the Netting Member's Margin Portfolio.

4.2.4 Repo Interest Volatility Charge

FICC/GSD guarantees that the borrower in a repo trade receives their repo collateral back at the close of the repo transaction while the lender receives the start amount paid on the repo inception date plus interest. Market risk of the underlying collateral is assessed with one of the methods in the above sections, depending on the type of collateral. The remaining risk component is that the interest on a repo is subject to the risk of movements of the market repo interest rates. This makes repo interest the relevant risk factor.

The two DTCC GCF repo interest rate indices that track the average daily interest rate paid for the most traded GCF repo contracts for Treasury and MBS securities are not granular enough to capture transaction-specific details of the repo trades in GSD clearing portfolio. If the two indices were used in the same manner as the risk factor time-series for priceable products, a large volume of long and short exposures with different terms, and different collateral sub-types would be netted out. As such, GSD repo contracts are classified into larger collection of buckets. The buckets differentiate special repos with underlying collateral consisting of certain "special" U.S. Treasury securities, and general repos referencing all other types of eligible collateral. The buckets are also differentiated according to time to settlement.

Repo interest volatility risk is handled with a haircut based approach. The repo volatility charge is calculated based on the following steps: 1) apply the corresponding haircut rate to each repo interest position based on whether it is long or short; 2) sum up the amounts derived from step 1 for position within each risk bucket, then take the absolute value thereof to obtain the charge for that risk bucket; 3) sum up the charges from all repo interest risk buckets to obtain the repo interest volatility charge for the portfolio.

4.3 Cross-Margin Eligible VaR

Pursuant to the Third Amended and Restated Cross-Margining Agreement between the Government Securities Division ("GSD") and the Chicago Mercantile Exchange ("CME"), GSD may recognize risk-reducing offsets between eligible GSD and CME positions maintained by an entity that is a Clearing Member of both FICC and CME or a Joint Clearing Member. A Customer Cross-Margining Arrangement is also established for Customers of Joint Clearing Members. The purpose of the GSD–CME Cross-Margin Value-at-Risk ("Cross-Margin Eligible VaR") is to measure the potential market risk of a Joint Clearing Member's combined eligible GSD and CME portfolios while conservatively reflecting diversification and hedging effects across the two clearing organizations.

Only positions that satisfy the eligibility criteria established under the GSD-CME cross-margining arrangement are included in the Cross-Margin VaR calculation.[17]. Positions that are not eligible for cross-margining remain subject to GSD's margin methodology and do not receive any cross-margin benefit.

GSD and CME separately calculate the Value-at-Risk for their respective eligible portfolios using their approved margin methodologies. Each clearing organization independently determines the potential margin reduction attributable to offsetting positions across the GSD and CME portfolios. The recognized cross-margin reduction applied by GSD is the more conservative of the reductions calculated by GSD and CME, thereby ensuring that margin requirements remain sufficient in the event of adverse market conditions.

[17] Cross-margin eligible securities as listed in Exhibit B of Cross-Margining Agreement (https://www.dtcc.com/~/media/Files/Downloads/legal/rules/ficc_cme_crossmargin_agreement.pdf)

4.4 VaR Floor

VaR Floor, with respect to each Margin Portfolio, is the greater of (i) the VaR Floor Percentage Amount and (ii) the Minimum Margin Amount. The VaR Floor would be used as the VaR Charge when the sum of the amounts calculated by the sensitivity approach and haircut method is less than the VaR Floor.

FICC's VaR Floor Percentage Amount seeks to address the risk that the VaR model calculates a VaR Charge that is erroneouslylow where the gross market value of unsettled positions in the Netting Member's Margin Portfolio is high and the cost of liquidation in the event of a Member default could also be high. This would be likely to occur when the proposed VaR model applies substantial risk offsets among long and short positions in different classes of securities that have a high degree of historical price correlation. Because this high degree of historical price correlation may not apply in future changing market conditions[18], FICC believes that it is prudent to apply a VaR Floor that is based upon the market value of the gross unsettled positions in the Netting Member's Margin Portfolio in order to protect FICC against such risk in the event that FICC is required to liquidate a large Netting Member's portfolio in stressed market conditions.

The VaR Floor Percentage Amount is calculated as the sum of the following two components: (1) a U.S. Treasury/Agency bond margin floor and (2) a mortgage-backed securities margin floor. The U.S. Treasury/Agency bond margin floor is calculated by mapping each U.S. Treasury/Agency security to a tenor bucket, then multiplying the gross positions of each tenor bucket by its bond floor rate[19], and summing the results. The mortgage-backed securities margin floor would be calculated by multiplying the gross market value of the total value of mortgage-backed securities in a Netting Member's portfolio by a designated amount, referred to as the pool floor rate[20].

4.5 Minimum Margin Amount

The Minimum Margin Amount is calculated at the Margin Portfolio level based on specified Net Unsettled Positions and is calculated as the sum of (1) a Filtered Historical Simulation (FHS) method that scales historical market price returns to current market volatility and (2) a haircut method for securities that lack sufficient historical price return data (see section 4.2, "Haircuts").

For the FHS methodology, FICC first constructs historical price returns using certain mapped fixed income securities benchmarks. The market volatility associated with each historical price return is estimated by applying exponentially weighted moving average ("EWMA") to the historical price returns over a 10-year lookback period plus additional stress period where applicable (consistent with the VaR model). The historical price returns are then "de-volatilized" by dividing them by the corresponding EWMA volatilities to obtain the residual returns. The residual returns are then "re-volatilized" by multiplying them by the current EWMA volatility to obtain the filtered returns.

The filtered return time series are then used to simulate the profits and losses of a Member's Margin Portfolio and derive the volatility of the Margin Portfolio using the standard historical simulation approach. In particular, each security that is in a Member's Margin Portfolio would be mapped to a respective fixed income securities benchmark, as applicable, based on the security's asset class and remaining maturity. The filtered returns of the benchmark are used as the simulated returns of the mapped security to calculate the simulated profits and losses of a Member's Margin Portfolio. The Minimum Margin Amount is then calculated as the 99-percentile of the simulated portfolio loss.

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[18] For example, and without limitation, certain securities may have highly correlated historical price returns, but if future market conditions were to substantially change, these historical correlations could break down, leading to model-generated offsets that would not adequately capture a portfolio's risk.

[19] For U.S. Treasury and agency securities, such percentage shall be a fraction, no less than 10%, of the historical minimum volatility of a benchmark fixed income index for such group by product and remaining maturity.

[20] For mortgage-backed securities, such percentage shall be a fixed percentage that is no less than 0.05%.

4.6 Bid-Ask Spread

For each GSD Margin Portfolio, the positions are segmented into asset-groups and sub asset-groups and the bid-ask charge is calculated as follows:

Asset Group	Sub Asset Group
Treasury	Remaining maturity less than 5 years
	Remaining maturity between 5 and less than 10 years
	Remaining maturity 10 years or more
TIPS	All TIPS
MBS	Pools
Agency	All Agency Bonds

$$\text{Bid-ask Charge} = \sum_{g \in S\text{ub Asset-groups}} GMV_g \cdot HC_g$$

GMV_g is the gross market value of all securities in the sub asset-group g, that is the sum of the gross market value of each netted position in the portfolio. $GMV_g = 0$ if there is no position of sub asset-group *g* in the portfolio. HC_g is the bid-ask haircut rate of sub asset-group *g*.

5. PORTFOLIO DIFFERENTIAL CHARGE

PD Charge is calculated as the front-weighted average of the historical cycle-over-cycle increase in the observed VaR Charges multiplied by the PD factor. For calculation of the charge at each margin cycle, first the calculation is done of the VaR Charge increase from that cycle to the next cycle at both the Legal Entity (LE) level and the Margin Portfolio level each day. Then EWMA is applied to the historical data of VaR increase to arrive at the PD Charge amount at both the LE level and the Margin Portfolio level. For the final PD Charge amount, the PD Charge amount at the LE level is allocated to each of its Margin Portfolios pro-rata to the PD Charge amounts of those Margin Portfolios.

5.1 PD Calculation

On each business day, we calculate PD Charge for each GSD member that is subject to margin requirement and each of their Margin Portfolios for margin cycle t (either Start-of-Day or Noon) with the formula below.

$$PD_{T,t} = \frac{\sum_{i=1}^{N} \theta^{(i-1)} * VaR\ Increase_{T-i,t}}{\sum_{i=1}^{N} \theta^{(i-1)}}$$

Here N is the lookback window model parameter, θ is the decay factor.

5.2 PD Charge Allocation

While the PD Charge is calculated at the member level, GSD applies VaR and other charges at the Margin Portfolio level. We allocate the member level PD Charge to its Margin Portfolios proportional to PD Charge calculated for those Margin Portfolios. For each Margin Portfolio i within a GSD legal entity (LE), its PD Charge is calculated as:

$$PD\ Charge_i = \frac{PD_{LE} * PD_i}{\sum_{j=1}^{M} PD_j} * PD\ factor$$

where PD factor is a model parameter.

6. MARGIN LIQUIDITY ADJUSTMENT

The GSD MLA charge applies to concentrated positions of Treasury securities (excluding TIPS), TIPS, Agency Bonds, Agency MBS pools, and Agency MBS TBAs. The charge depends on the level of concentration relative to the market depth and the market volatilities. GSD's MLA methodology divides a closeout portfolio into asset-groups ("market liquidity segments") across similar market risk characteristics, trading venues and market microstructures, participants and investor bases. Securities within each of those market liquidity segments exhibit similar trading and liquidity profiles. Their liquidities are fungible. Their price changes are highly correlated, often can be used to hedge each other.

GSD segments the relevant markets into four asset groups: 1) Treasury securities (excluding TIPS), 2) TIPS, 3) Agency bonds, and 4) Agency MBS (pools and TBAs). The asset group of Treasury security is further divided into five tenor buckets: i) securities with remaining maturities less than one year, ii) securities with remaining maturities between one and less than two years, iii) securities with remaining maturities between two and five years, iv) securities with remaining maturities between five and less than ten years and v) securities with remaining maturities ten years or more. The TIPS asset group is further divided into four tenor buckets: i) TIPS with remaining maturities less than two years, ii) TIPS with remaining maturities between two and less than six years, iii) TIPS with remaining maturities between six and less than eleven years, and iv) TIPS with maturities eleven years or more.

The MLA is assessed at the asset class level and summed up to the member level. The assessment of MLA charge involves calculating the liquidation impact cost of securities in each asset group and comparing the impact cost to the core charge allocated to the asset group. When the ratio of the impact cost to the allocated core charge exceeds the threshold, MLA charge will be assessed for that asset group. The amount of the MLA charge is approximately linearly proportional to the exceedance of the threshold and linearly proportional to the allocated core charge. For the applied MLA Charge GSD may apply a downward adjusting scaling factor based on the ratio of the calculated market impact cost to a portion of the VaR Charge, where a higher ratio would trigger a larger downward adjustment of the MLA Charge and a lower ratio would trigger no downward adjustment of the MLA Charge.

The calculation of the impact cost has two components: (1) the directional market impact cost and (2) the basis cost, which is based on the net unsettled positions' gross market value (not applicable for TIPS <1yr maturity in GSD). The first component is a function of the directional market value, market depth parameter, and volatility parameter. The directional market value is defined as the absolute value of the net market value of securities in an asset group/tenor bucket. The second component is basis cost that is a function of the gross market value, market depth parameter, and basis volatility parameters.

7. BLACKOUT PERIOD EXPOSURE ADJUSTMENT

The Blackout Period Exposure Adjustment is only be imposed during the Blackout Period which, with respect to the Blackout Period Exposure Charge, is the period between the last business day of the prior month and the date during the current month upon which a government-sponsored entity that issues mortgage-backed securities publishes its updated Pool Factors.

The Blackout Period Exposure Adjustment is calculated by (1) projecting an average pay-down rate for the government sponsored enterprises (Fannie Mae and Freddie Mac) and the Government National Mortgage Association (Ginnie Mae), respectively, then (2) multiplying the projected pay-down rate[21] by the net positions of MBS in the related program, and (3) summing the results from each program.

[21] GSD calculates the projected average pay-down rates each month using historical pool factor pay-down rates that are weighted by historical positions during each of the prior three months. Specifically, the projected pay-down rate for a current Blackout Period is an average of the weighted averages of pay-down rates for all active mortgage pools of the related program during the three most recent preceding months.

8. BACKTESTING CHARGE

The objective of the Backtesting Charge is to increase the Required Fund Deposit for Netting Members and Segregated Indirect Participants that are likely to experience backtesting deficiencies by an amount sufficient to maintain such Netting Member's and Segregated Indirect Participant's backtesting coverage above the 99% confidence threshold. FICC may assess this charge on a Netting Member's or Segregated Indirect Participant's start of the day Margin Portfolio and/or its intraday Margin Portfolio, as needed, to enable FICC to achieve its backtesting coverage target.

FICC employs daily backtesting to determine the adequacy of each Netting Member's Required Fund Deposit and each Segregated Indirect Participant's Segregated Customer Margin. FICC compares the Required Fund Deposit for each Netting Member or Segregated Customer Margin of each Segregated Indirect Participant with the simulated liquidation gains/losses using a snapshot of the actual positions in the Netting Member's or Segregated Indirect Participant's Margin Portfolio, and the actual historical security returns. Backtesting compares the Required Fund Deposit and Segregated Customer Margin to a snapshot of the Netting Member's or Segregated Indirect Participant's Margin Portfolio at end-of-day and at noon. FICC investigates the cause(s) of any backtesting deficiencies. As a part of this investigation, FICC pays particular attention to Netting Members or Segregated Indirect Participants with backtesting deficiencies that bring the results for that Netting Member or Segregated Indirect Participant below the 99% confidence target (i.e., greater than two backtesting deficiency days in a rolling twelve-month period) to determine if there is an identifiable cause of repeat backtesting deficiencies. FICC also evaluates whether multiple Netting Members or Segregated Indirect Participants may experience backtesting deficiencies for the same underlying reason.

Because the settlement activity and size of the backtesting deficiencies varies among impacted Netting Members and Segregated Indirect Participants, FICC must assess a Backtesting Charge that is specific to each impacted Netting Member or Segregated Indirect Participant.

To do so, FICC examines each impacted Netting Member's or Segregated Indirect Participant's historical backtesting deficiencies observed over the prior 12-month period to identify the three largest backtesting deficiencies that have occurred during that time. The Backtesting Charge amount generally equals that Netting Member's or Segregated Indirect Participant's third largest historical backtesting deficiency that has occurred during the previous 12 months[22], subject to adjustment as further described below.

This charge is only applicable to those Netting Members or Segregated Indirect Participants whose overall 12-month trailing backtesting coverage falls below the 99% coverage target. Although the third largest historical backtesting deficiency that has occurred during the previous 12 months for a Netting Member or Segregated Indirect Participant is used as the Backtesting Charge in most cases, FICC retains discretion to adjust the charge amount based on other circumstances that may be relevant for assessing whether an impacted Netting Member or Segregated Indirect Participant is likely to experience future backtesting deficiencies and the estimated size of such deficiencies.

[22] Any backtesting deficiencies that are attributed to GCF Repo Transactions collateralized with MBS during the Blackout Period would only be considered in calculation of the Backtesting Charge during the Blackout Period.

9. VOLATILITY EVENT CHARGE

The Volatility Event Charge is designed to provide a proactive mechanism to complement GSD's VaR model by managing FICC's member-level market risk exposure and backtesting performance. The Volatility Event Charge is an additional charge that is collected from Members to mitigate FICC's exposures arising from potential adverse market impact due to a scheduled event that has the potential to impact market volatility, such as the release of an economic indicator or a national election. It would be assessed with respect to each Member portfolio at GSD, as well as each Segregated Indirect Participant at GSD, for periods in which markets are heavily influenced by anticipation and resolution of a scheduled event. The Volatility Event Charge is assessed twice a day at GSD beginning on the day of the coverage period when one or more of the forward-looking market volatility indicators exceed the threshold(s) specified by FICC and ending on the day of the scheduled event. FICC calculates the Volatility Event Charge by multiplying the VaR charge of the relevant Member portfolio by a multiplier[23]. The notification of applicable scheduled events, forward-looking market volatility indicators, and associated charge parameters will be made available through an Important Notice to be issued no less than one Business Day prior to the start of either the quarter or the coverage period of the first scheduled event in the quarter, whichever is earlier.

[23] The multiplier will be no less than 10 percent and no greater than 30 percent.

10. HOLIDAY CHARGE

The Holiday Charge approximates the exposure that a Netting Member's or Segregated Indirect Participant's trading activity on the applicableHoliday could pose to FICC. Since the FICC cannot collect margin on the Holiday, the Holiday Charge is due on the Business Day prior to the applicable Holiday.

Netting Members and Segregated Indirect Participants would be notified of a Holiday Charge and the applicable methodology by an Important Notice issued no later than 10 Business Days prior to the application of the Holiday Charge. The charge is collected on the Business Day prior to the applicable Holiday and removed from the Required Fund Deposit or Segregated Customer margin Requirementon the Business Day following the Holiday.

11. SPECIAL CHARGE

In order to mitigate exposure from certain market conditions and other financial and operational capabilities of a Member, GSD may impose a special charge. The following factors are generally taken into consideration prior to assessing a special charge (i) the impact of the special charge on the total Required Fund Deposit; (ii) Member's requirement history; (iii) simulated closeout results; (iv) liquidity arrangements and credit rating outlook assigned by DTCC's Counterparty Credit Risk team; (v) backtesting deficiencies or (vi) any additional concerns related to the Netting Member.

12. OTHER CHARGES

GSD applies a premium charge to Netting Members in instances where the calculated VaR exceeds its specified regulatory capital figure. This premium charge is known as the “Excess Capital Premium.” It is similar to a premium charge applied to Clearing Members of the MBSD of FICC.

Additional compliance charges may also apply to a particular Netting Member. For example, the failure to submit certain required reports and other information as set forth in the GSD rules will subject a Netting Member to the greater of either the sum of the normal calculation of its Required Fund Deposit plus $1,000,000, or 125% of the normal calculation of its Required Fund Deposit, until the required information is submitted to GSD.

Similarly, failure to comply with the GSD’s minimum financial requirements will subject the Netting Member to the greater of either the sum of the normal calculation of the Netting Member’s Required Fund Deposit plus $1,000,000, or 125% of the normal calculation of the Required Fund Deposit. This charge will remain until the 90th calendar day after the later of the date on which the Netting Member returned to compliance with such standard or the GSD’s receipt of notice of the applicable violation.

The Minimum Deposit Special Charge ensures each Member maintains a minimum Clearing Fund deposit. If a Member’s calculated Required Fund Deposit/Segregated Customer Margin falls below the required minimum, GSD applies this charge to bring the deposit up to the required minimum charge.

Pursuant to the GSD Rules, GSD also has the authority to collect charges above the systemically generated Required Fund Deposit when deemed appropriate in order to protect GSD and its Netting Members.

13. INTRADAY MARGIN CHARGES

FICC will calculate margin requirements, including mark to market for cash positions and repo interests, twice daily based on 12:00p.m. position and end-of-day position, and collect them at 2:45p.m. and 9:30a.m. in the morning of the next business day, respectively. All the charges in the above sub-sections will be calculated with the updated positions for both end-of-the-day and intraday in the similar fashion.

In addition, the GSD Rules give FICC the authority to collect intraday margin charges from Netting Members and Segregated Indirect Participants, as further described below.

FICC risk systems monitor intraday exposures on a 15-minute basis between 8:00 am and 7:00 pm. FICC generally conducts intraday monitoring of its exposures for purposes of assessing intraday margin charges at 15-minute intervals between the hours of 8:00 am to 4:30 pm. However, FICC maintains authority and operational capacity to collect intraday margin charges at any time during the system monitoring window if circumstances warrant.

13.1 Intraday Supplemental Fund Deposit

Intraday Supplemental Fund Deposits is determined based on GSD's observations of a Netting Member's and/or Segregated Indirect Participant's simulated VaR Charge as it is re-calculated throughout the trading day based on the open positions of such Member's Margin Portfolio at designated times (the "Intraday VaR Charge").[24]

The Intraday Supplemental Fund Deposit is designed to mitigate exposure to GSD that results from large fluctuations in a Netting Member's or Segregated Indirect Participant's Margin Portfolio due to new and unsettled trade activities that are not otherwise covered by a Netting Member's recently collected Required Fund Deposit or Segregated Indirect Participant's Segregated Margin Requirement.

13.1.1 Intraday Supplemental Fund Deposit Monitoring Threshold

Currently, FICC determines whether to assess an Intraday Supplemental Fund Deposit by tracking three criteria (each, a "Parameter Break") for each Margin Portfolio of a Netting Member and each Segregated Indirect Participant.

1. The first Parameter Break evaluates whether the Intraday VaR Charge of a Margin Portfolio of a Netting Member or Segregated Indirect Participant equals or exceeds $1,000,000 (as determined by FICC from time to time) when compared to the VaR Charge that was included in the most recently collected Required Fund Deposit/Segregated Customer Margin Requirement, including, any subsequently collected Intraday Supplemental Fund Deposit (the "Dollar Threshold").
2. The second Parameter Break evaluates whether the Intraday VaR Charge equals or exceeds a percentage increase of 100% (as determined by FICC from time to time) of the VaR Charge that was included in the most recently collected Required Fund Deposit/Segregated Customer Margin Requirement, including, if applicable, any subsequently collected Intraday Supplemental Fund Deposit (the "Percentage Threshold").
3. The third Parameter Break evaluates whether a Netting Member/Segregated Indirect Participant is experiencing backtesting results below a set confidence level (as determined by FICC from time to time) (the "Coverage Target"). The Coverage Target is in breach when the Netting Member or Segregated Indirect Participant has fewer than 100 trading days or a rolling 12-month backtesting coverage target less than 100%.

[24] See GSD Rule 4, Section 2a (Intraday Calculation of VaR Amounts – Intraday Supplemental Fund Deposit)

If a Netting Member/Segregated Indirect Participant breaches all Parameter Breaks, FICC assesses an Intraday Supplemental Fund Deposit which will be adjusted by the Portfolio Differential ("PD") charge collected during that margin cycle as the PD charge already accounts for the Netting Member's Margin Portfolio/Segregated Indirect Participant variability, and by the Backtesting Charge, if applicable, collected during that margin cycle, which accounts for the Netting Member's or Segregated Indirect Participant's backtesting deficiencies.

Members may be required to make an Intraday Supplemental Fund Deposit during elevated volatility market conditions. Examples of elevated volatility market conditions may include, but shall not be limited to, the occurrence of sudden swings in U.S. Treasury yields or mortgage-backed security spreads outside of historically observed market moves and/or conditions contributing to intraday risk exposures to FICC that, in aggregate, materially exceed intraday risk exposures observed under normal market conditions.

13.1.2 Intraday Supplemental Fund Deposit Waiver / Reduction / Determination Not to Collect

FICC may determine not to collect the Intraday Supplemental Fund Deposit or decrease the amount of the Intraday Supplemental Fund Deposit in circumstances where FICC determines that the volatility-based intraday exposure of the Netting Member or Segregated Indirect Participant and/or the breaches of the threshold amount do not accurately reflect FICC's risk exposure to the Netting Member or Segregate Indirect Participant. Reasons for this determination include but are not limited to:

- There are changes in portfolio composition resulting in the threshold amount not being breached on a consistent or persistent basis.
- There are trades that will be offset by trades submitted later in the day. The threshold amount was breached due to the submission of erroneous trades that are being corrected.
- The threshold amount was breached due to erroneous data inputs.

FICC may waive the collection of an Intraday Supplemental Fund Deposit in exigent circumstances if it determines (i) that such a waiver is necessary to protect itself, its participants, investors and the public interest or (ii) it can effectively address the risk exposure presented by the Netting Member or Segregated Indirect Participant without the collection of the Intraday Supplemental Fund Deposit.

FICC provides tools, as discussed in the section below, to allow a Member to hypothesize trades to demonstrate impact to Required Fund Deposits/Segregated Customer Margin Requirements. The FICC Risk Reporting portal can also be used by Members to track and understand Required Fund Deposits/Segregated Customer Margin Requirements.

13.2 Intraday Mark-to-Market Charge

The Intraday Mark-to-Market ("IMTM") Charge is an additional charge that is collected from a Netting Member or Segregated Indirect Participant to mitigate GSD's exposure due to adverse intraday changes in the size, composition, and constituent security prices of such Netting Member's or Segregated Indirect Participant's portfolio ("MTM Exposure").

The IMTM Charge is calculated using mark-to-market ("MTM") amounts already included in the Netting Member's/Segregated Indirect Participant's FOS amounts/IMTM and calculating the change in MTM for the Netting Member's/Segregated Indirect Participant's current portfolio marked to the most recently observed price for its positions.

13.2.1 Intraday Mark-to-Market Charge Monitoring Threshold

Currently, FICC determines whether to assess IMTM Charges by tracking three criteria (each, a "Parameter Break") for each Netting Member's/Segregated Indirect Participant's portfolio.

1. The first Parameter Break evaluates whether a Netting Member's MTM Exposure equals or exceeds $1,000,000 (as determined by FICC from time to time) when compared to the MTM amount reflected either in the last Funds-Only Settlement Amount or IMTM Charge, as applicable, for the Netting Member's/Segregated Indirect Participant's portfolio (the "Dollar Threshold").
2. The second Parameter Break evaluates whether MTM Exposure equals or exceeds a percentage increase of 30% (as determined by FICC from time to time) of the VaR Charge that was calculated for the Netting Member's/Segregated Indirect Participant's portfolio (the "Percentage Threshold").
3. The third Parameter Break evaluates whether a Netting Member's/Segregated Indirect Participant's portfolio has either (x) fewer than 100 trading days in a rolling 12-month period or (y) is experiencing 12-month backtesting results below a set confidence level (as determined by FICC from time to time) (the "Coverage Target").

During volatile market conditions, FICC may reduce the Dollar Threshold, the Percentage Threshold, and/or elect to modify or not consider the 12-month backtesting coverage threshold. Examples of volatile market conditions may include, but are not limited to (1) sudden swings in U.S. Treasury yields and mortgage-backed securities spreads outside of historically observed market moves and/or (2) conditions contributing to intraday risk exposures to FICC that, in aggregate, materially exceed intraday risk exposures observed under normal market conditions.

13.2.2 Intraday Mark-to-Market Charge Waiver/Adjustment

FICC retains discretion to waive or decrease Intraday Mark-to-Market Charge in circumstances where it determines that the MTM Exposure and/or the breaches of the three Parameter Breaks do not accurately reflect FICC's risk exposure from the intraday mark-to-market fluctuation of the Netting Member's/Segregated Indirect Participant's portfolio. Examples of such circumstances include but are not limited to when a Member's/Segregated Indirect Participant's breach of the Parameter Breaks is based on MTM Exposures arising out of trade errors.

14. MEMBER TOOLS AND GUIDES

FICC provides Members with a suite of Risk Management Tools which can be used to understand margin requirements and monitor intraday exposures. These tools include:

- Reports in the FICC Risk Reporting Portal which can be used to monitor intraday market risk exposures can be found here.
- Risk calculators to estimate potential obligations can be found here.

The DTCC Learning Center contains other user guides. You must be logged in to the Portal or the Learning Center to see all of the available content on the Learning Center.

APPENDIX A: SPONSORING MEMBERS AND SPONSORED MEMBERS CONSIDERATIONS

In addition to all calculations applicable to Netting Members as described above, Sponsoring Members[25] and Sponsored Members[26] are subject to following Clearing Fund requirements:

VaR Charge Applicable to Sponsoring Members

VaR Charge for Sponsoring Member is calculated as the sum of the VaR Charges for all of the Sponsored Members whose activity is represented in the Sponsoring Member Omnibus Account and subject to VaR Charges as described in the Rules.

Application of the Higher of VaR Charge

For each Sponsored Member and/or Segregated Indirect Participant, the sum of Receive Obligations and Funds-Only Settlement Amounts are recorded for the Sponsored Member and/or Segregated Indirect Participant across all Accounts and compared against FICC's Daily Liquidity Need. If on any Business Day the aggregate sum of Receive Obligations and Funds-Only Settlement Amounts of the Sponsored Member and/or Segregated Indirect Participant across all Accounts exceeds FICC's Daily Liquidity Need[27], for purposes of calculating the Unadjusted GSD Margin Portfolio Amount, FICC shall apply the higher of the VaR Charge calculation as of the beginning of the day and intraday, as the intraday VaR Charge to the Sponsored Member and/or Segregated Indirect Participant for the following 25 Business Days.

For example, Sponsored Member X submits transactions through four different Sponsoring Members, generating Receive Obligations and Funds-Only Settlement Amounts that total $100 billion on Day 1, and the FICC's Daily Liquidity Need on Day 1 is $80 billion, then FICC would impose the higher of VaR Charge calculation methodology on Sponsored Member X for the next 25 Business Days, (*i.e.,* Day 2 to Day 27), Sponsored Member X the higher of its start of day VaR Charge and intraday VaR Charge for the noon margin cycle.

Sponsored GC CIL Omnibus Account

A Sponsored Member operating a Collateral-in-Lieu (CIL) account at GSD must act as a CIL Funds Lender. A Sponsored GC CIL Omnibus Account Required Fund Deposit shall only be calculated with respect to a Sponsored GC CIL Omnibus Account if (1) the Sponsored GC CIL Omnibus Account has been enabled to record Sponsored GC CIL Trades for which the pre-Novation counterparty to the CIL Funds Lender is its Sponsoring Member or a Segregated Indirect Participant or Cross-Margining

[25] As defined in GSD Rule 1 (Definitions), the term "Sponsoring Member" means a Netting Member whose application to become a Sponsoring Member has been approved by FICC pursuant to GSD Rule 3A.

[26] As defined in GSD Rule 1 (Definitions), the term "Sponsored Member" means any Person that has been approved by FICC to be sponsored into membership by a Sponsoring Member pursuant to GSD Rule 3A.

[27] The largest payment obligation of FICC as a central counterparty, as calculated and determined by FICC, for all projected same day, intraday and multiday settlement activity (where appropriate), assuming the default on that day of a Netting Member or, for an Affiliated Family, the largest payment obligation that FICC would have in the event of the simultaneous default of all Members of that Affiliated Family.

Customer of its Sponsoring Member; and (2) that Sponsoring Member or its Affiliate has a Segregated Indirect Participants Account or Cross-Margining Customer Account, respectively.

VaR Charge Applicable to CIL Accounts

CIL accounts are subjected to a VaR Charge when the calculated VaR for the CIL Funds Lender exceeds the aggregate 2% CIL required haircuts, with the Sponsored GC CIL Omnibus Account being charged the positive difference.

The VaR Charge would be calculated for each CIL Funds Lender as the positive difference between (1) the amount of VaR Charge that FICC would have collected if the Sponsored GC CIL Trades of that CIL Funds Lender had been subject to the calculation of a Sponsoring Member Omnibus Account Required Fund Deposit, and (2) the aggregate of all CIL Required Haircuts on that CIL Funds Lender's Sponsored GC CIL Trades.

Margin Liquidity Adjustment Charge Applicable to Sponsored Members that Clear Through Multiple Accounts

If applicable, GSD calculates the MLA Charge for Sponsored Members that clear through multiple accounts sponsored by multiple Sponsoring Members to better align with the market impact cost arising from position concentration of the Sponsored Member's respective Sponsored accounts. Those Sponsored Members' accounts with higher relative market impact cost and a lower relative VaR Charge would be apportioned a higher amount of the additional market impact cost than those Sponsored Member's accounts with lower relative market impact cost and a higher relative VaR Charge.

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