Overview on Risk Management

Risk Management

- The Covered Clearing Agency Standards establish minimum requirements regarding how registered clearing agencies must maintain effective risk management procedures and controls as well as meet the statutory requirements under the Exchange Act on an ongoing basis
- Risk management is the foundation for the Government Securities Division of FICC (FICC/GSD's) ability to guarantee settlement, as well as the means by which it protects itself and its Members from the risks inherent in the settlement process
- FICC/GSD maintains strict membership standards, including minimum financial requirements and Members are subject to ongoing review following admission
- FICC/GSD's Clearing Fund addresses potential Member exposure through a number of risk-based component charges

Clearing Fund Requirement

Purpose

- The clearing fund requirement is calculated to cover the risk associated with liquidation of a Member's portfolio in the event of such Member default
- Calculated daily by using a risk-based margin methodology and based upon each Member's unsettled and pending transactions
- Source of liquidity

Composition

Cash & Securities

- Minimum of 40% must be in cash (USD) and/or Eligible Clearing Fund Treasury Securities.
- U.S. Treasuries, agency securities, mortgage-backed securities
- The lesser of $5,000,000 or 10 percent of the Required Fund Deposit, with a minimum of $1,000,000 (or $5 million for Repo Broker), must be made and maintained in cash, with the remaining portion of the Required Fund Deposit to be made and maintained in cash or Eligible Clearing Fund Securities

Process

- Required Fund Deposits are collected twice each business day based on a Member's 12:00 p.m. and end-of-day positions
- Deficits are collected at 2:45 p.m. on the current day and 9:30 a.m. on the next business day

FICC/GSD Clearing Fund Components

Value at Risk (VaR):

- VaR is the primary component in FICC/GSD's Clearing Fund requirement calculation accounting for more than 90% of the Total Required Fund Deposit.
- Relies on a rolling 10-year historical lookback period plus an additional stress period (if necessary) of profit and loss data in the bond market, forming a population of over 2,500 daily market returns
- FICC/GSD's VaR utilizes a 3-day liquidation horizon and a 99th percentile coverage
  - The 3-day liquidation horizon is consistent with the expected length of time that DTCC believes it would take to liquidate and or hedge a defaulted Member's portfolio
  - The model is calibrated to the 99th percentile of the lookback period, meaning we should have sufficient VaR to cover 99% of all 3-day market moves in the lookback period.
- While many factors may impact a Member's VaR calculation, two key concepts that can help drive VaR are durations and directionality
  - Duration is a risk measure which captures cash flow weighted time to maturity. Longer maturing securities generally carry more risk.
  - Directionality refers to the long vs. short bias of a portfolio (i.e. more buys than sells)

Portfolio Differential (PD):

- PD is designed to mitigate risk of intraday positions changes that occur between margin cycles
- Based on the cycle-over-cycle increase in VaR over a 100-day lookback period

Margin Liquidity Adjustment (MLA):

- MLA is designed to address the risk of a potential increase in costs incurred by FICC/GSD from the liquidation of a defaulting Member's portfolio that is concentrated in a single asset class

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FICC/GSD Clearing Fund Components (continued)

Backtesting Charge:

- This charge is applied to Member's that have 12-month trailing backtesting coverage below 99%

Blackout Period Exposure Adjustment:

- BPE adjustment is applied to Members who collateralize their repos with mortgage-backed securities (MBS) during the blackout period.
  - For MBS, there's a period at the beginning of each month when the decrease in remaining principal balance due to paydowns is not known. BPE is designed to estimate that loss in value by collecting additional margin.

Additional Clearing Fund Premiums and Special Charges:

- These encompass an array of components designed to take effect when a Member's portfolio or activity presents a specific risk
  - Examples include Special Charge, Excess Capital Premium, Falling Below Minimum Requirements, and Adequate Assurance

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Daily Backtesting

To assess whether FICC/GSD's Clearing Fund model is calculating enough margin to adequately protect against losses, FICC/GSD performs backtesting daily.

- FICC/GSD performs CFR Backtest at End of Day and Noon
- FICC/GSD's backtesting program specifically looks at whether the margin collected at a given point in time would have been sufficient to cover losses on the Member's portfolio
  - Uses 3-day price returns on the Member's portfolio as observed in the market, consistent with the 3-day liquidation horizon assumption in the VaR model
- CFR backtesting assumes the Member defaults at a specified time (Noon or End of Day), and the total loss includes the 3-day profits and losses plus market moves on the day of default and compares those losses to the margin on hand at the default time
- Members that do not maintain a 99% CFR backtesting coverage are subject to the Backtesting Charge
- FICC/GSD also performs VaR Backtest on a daily basis, comparing the VaR calculation to 3-day profits and losses to test VaR model sufficiency in current market conditions

Hourly VaR Monitoring

While Clearing Fund is the primary tool used to protect against losses in the event of a Member default, it's calculated using a Member's portfolio at a single point in time. To protect against new trades and trades that have settled, FICC/GSD utilizes Intraday VaR monitoring.

- Intraday VaR: FICC/GSD recalculates each Member's VaR on an hourly basis to determine if the real-time portfolio's risk is larger than the risk that the prior margin collection is able to cover
  - Intraday VaR is calculated hourly from 8:00am to 4:00pm
  - If a Member's VaR increases above established thresholds, then an Intraday VaR charge is collected
  - Intraday VaR is driven by changes in the Member's portfolio (i.e. new positions put on or settlement of old positions)

Maturity Bucket	Net Market Value T-1	Net Market Value T	Net Market Value Delta	Contribution VaR T-1	Contribution VaR T	Contribution VaR Delta
2 years+1 day - 5 years	(171,139,842)	(1,351,372,614)	(1,180,232,772)	1,999,103	15,551,763	13,552,660
5 years+1 day - 7 years	(1,482,572,628)	(2,742,757,002)	(1,260,184,374)	19,683,580	43,616,368	23,932,788
7 years+1 day - 10 years	856,088,309	(36,685,466)	(892,773,775)	(13,384,007)	1,179,230	14,563,237
15 years+1 day - 20 years	3,030,468	194,909,472	191,879,004	(59,801)	(4,127,097)	(4,067,296)
20 years+1 day +	(525,735,000)	(924,394,308)	(398,659,308)	14,235,014	20,950,909	6,715,894
Grand Total	**(1,320,328,693)**	**(4,860,299,918)**	**(3,539,971,225)**	**22,473,890**	**77,171,174**	**54,697,284**

Sensitivity Based Approach

Key Components	External Vendor	In House
	Risk sensitivities data for Risk Factors	Position
	Risk-factor time series data	Resources ($ collected)

- Clearing portfolio risk profile is decomposed and represented by the behaviors of a few intuitive and representative market risk drivers (factors).
- Risk sensitivities measure the degree of responsiveness of a portfolio's value to the changes of these risk factors.
- A portfolio's value changes (P&L) is therefore a simple (linear) summation of the product of risk exposures and these risk factor movements

Key Benefits

- Transparency to risk managers and to Members
- Quicker time-to-market Adjustment
- Scalable to include new products and risk factors

Sensitivity Based Approach - Risk Drivers & Sensitivities

Sensitivities & Risk Factors	
Sensitivity	**Risk Factors w/ Tenors**
Key Rate Duration	3M, 1Y, 2Y, 3Y, 5Y, 7Y, 10Y, 15Y, 20Y, 25Y, 30Y
Key Rate Convexity	2Yx2Y, 2Yx5Y, 2Yx10Y, 2Yx30Y, 5Yx5Y, 5Yx10Y, 5Yx30Y, 10Yx10Y, 10Yx30Y, 30Yx30Y
OAS Spread Duration	OAS at various coupon money-ness OAS basis 15Y vs. 30Y OAS basis GN vs. UMBS
Volatility Vega	Swaption Implied Volatility (5Y option on 10Y swap)
Mortgage Basis DV01	30Y Mortgage Basis 15Y Mortgage Basis
Agency Spread	2Y, 5Y, 10Y, 30Y
Inflation	3M, 1Y, 2Y, 3Y, 5Y, 7Y, 10Y, 15Y, 20Y, 25Y, 30Y
Time	One day

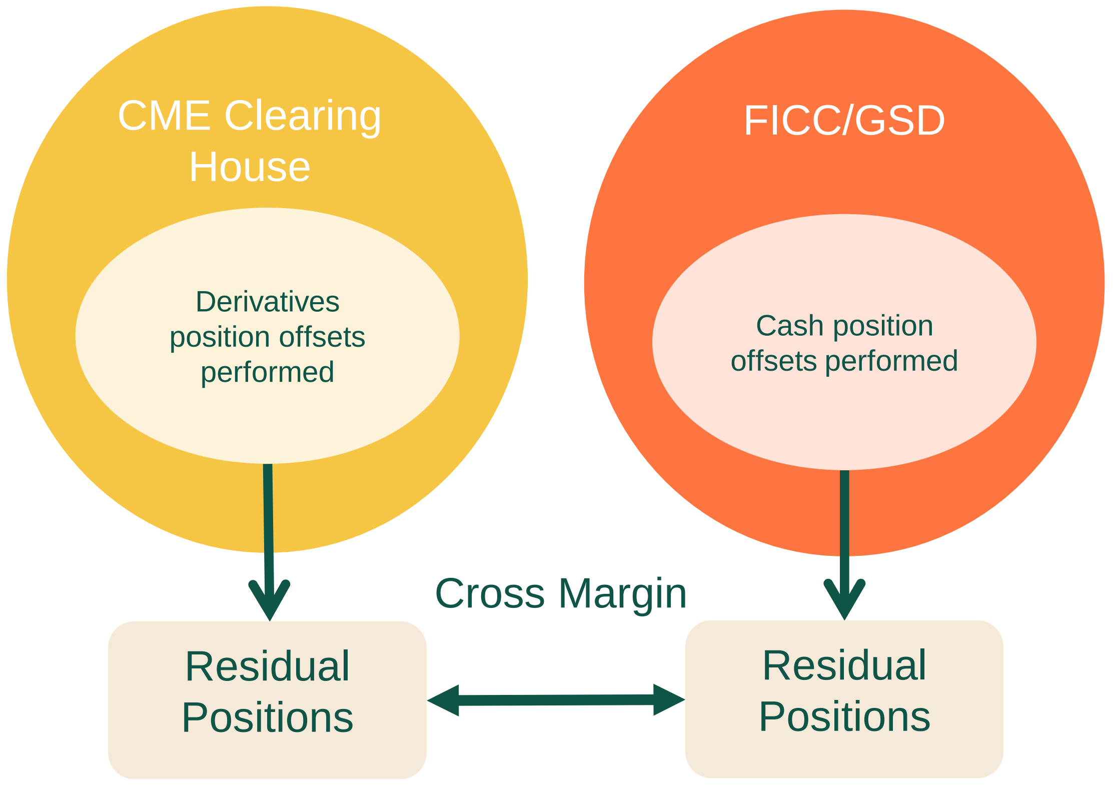
CME Group -FICC Enhanced Cross-Margining Arrangement

CME Group-FICC Enhanced Cross-Margining

Current Methodology

- Today, the CME Group – FICC Cross-Margining Arrangement allows for cross-margining of CME Group interest rate futures with FICC cleared cash Treasuries.
- FICC and CME Clearing each separately hold and manage their own positions and collateral and independently determine the amount of margin that it would make available for cross-margining.
- Operationally, the current arrangement is light touch, with no affirmative daily management required by participating members.
- Current arrangement is applicable to house (proprietary) accounts of CME Clearing Members and FICC/GSD Netting Members.
- Approximately 30 members are eligible for the current arrangement with several firms receiving some benefit on each day.

Current Structure

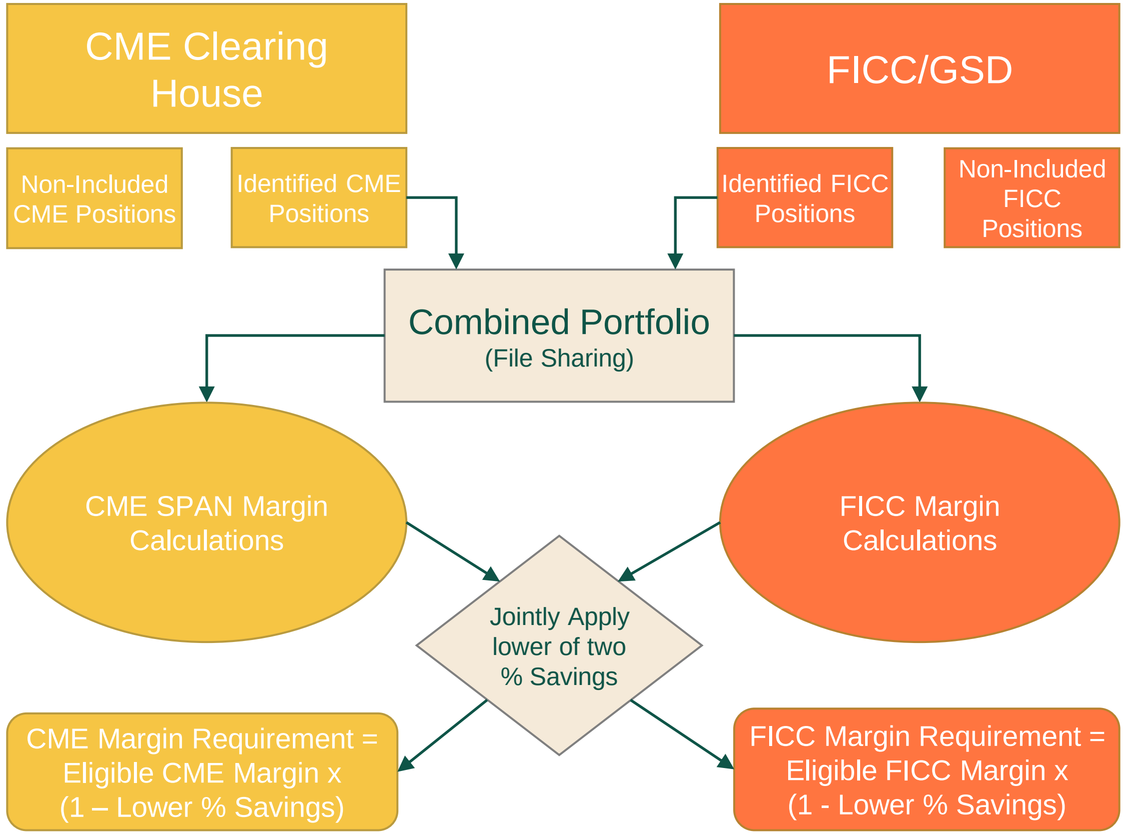


CME Group-FICC Enhanced Cross-Margining

Enhanced Methodology

- **Key Enhancements:**
  - Introduce active management aspect applicable to CME Group eligible positions; passive management remains for FICC eligible positions.
  - Expand the list of CME Group eligible interest rate futures products available for cross-margining.
- **Timeline to Implementation:**
  - Operational testing available today. FICC offers a cross-margin report to support operational testing.
  - Target Implementation Date: January 22, 2024.
- **Eligibility:**
  - Eligibility for the arrangement remains house (proprietary) accounts of CME Clearing Members & FICC/GSD Netting Members, however, subject to regulatory analyses and approvals, CME Group & FICC are supportive of extending this program beyond house accounts as part of a later phase.

Enhanced Arrangement



CME Group-FICC Enhanced Cross-Margining

Examples

	CME Group Treasury Futures		FICC Treasury Securities		Savings w/ Enhanced Cross-Margining	
	Position	Margin	Position	Margin	$	%
Portfolio 1:	1,000 SEP 2yr Contracts	$1,050,000	($222,000,000) in 2yr Treasury Notes	$943,000	$1,594,400	~80%
Portfolio 2:	2,000 SEP 5yr Contracts	$2,800,000	($250,000,000) in 5yr Treasury Notes	$2,900,000	$4,560,000	~80%
Portfolio 3:	2,000 SEP 10yr Contracts	$4,000,000	($270,000,000) in 10yr Treasury Notes	$6,000,000	$8,000,000	~80%
Portfolio 4:	2,000 SEP 30yr Contracts	$7,800,000	($334,000,000) in 30yr Treasury Bonds	$13,000,000	$16,640,000	~80%

Note: Margin rates and savings subject to change based upon market conditions and portfolio composition

CME Group-FICC Enhanced Cross-Margining

FICC/GSD Portfolio

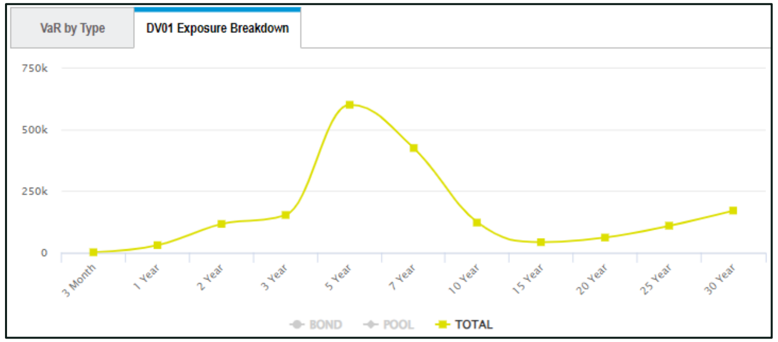
$7BN Net Short Treasuries

$4BN Net Long Treasuries

$500K Net Long MBS

Example Cross-Margined Portfolio

DV01 of FICC/GSD's XM Eligible Positions on $3.5BN net short portfolio had the largest exposure on 3y/5y/7y/10y



CME Portfolio

2,500 2yr

18,000 5yr

11,000 10yr

100 30yr

FICC/GSD Calculates $30.25MM for joint margin (75% offset)

CME Calculates $36.3MM for joint margin (70% offset)

More conservative reduction factor of 70% will be selected

Final FICC Requirement: at FICC/GSD, Member received total of 54.5% reduction from initial $60MM

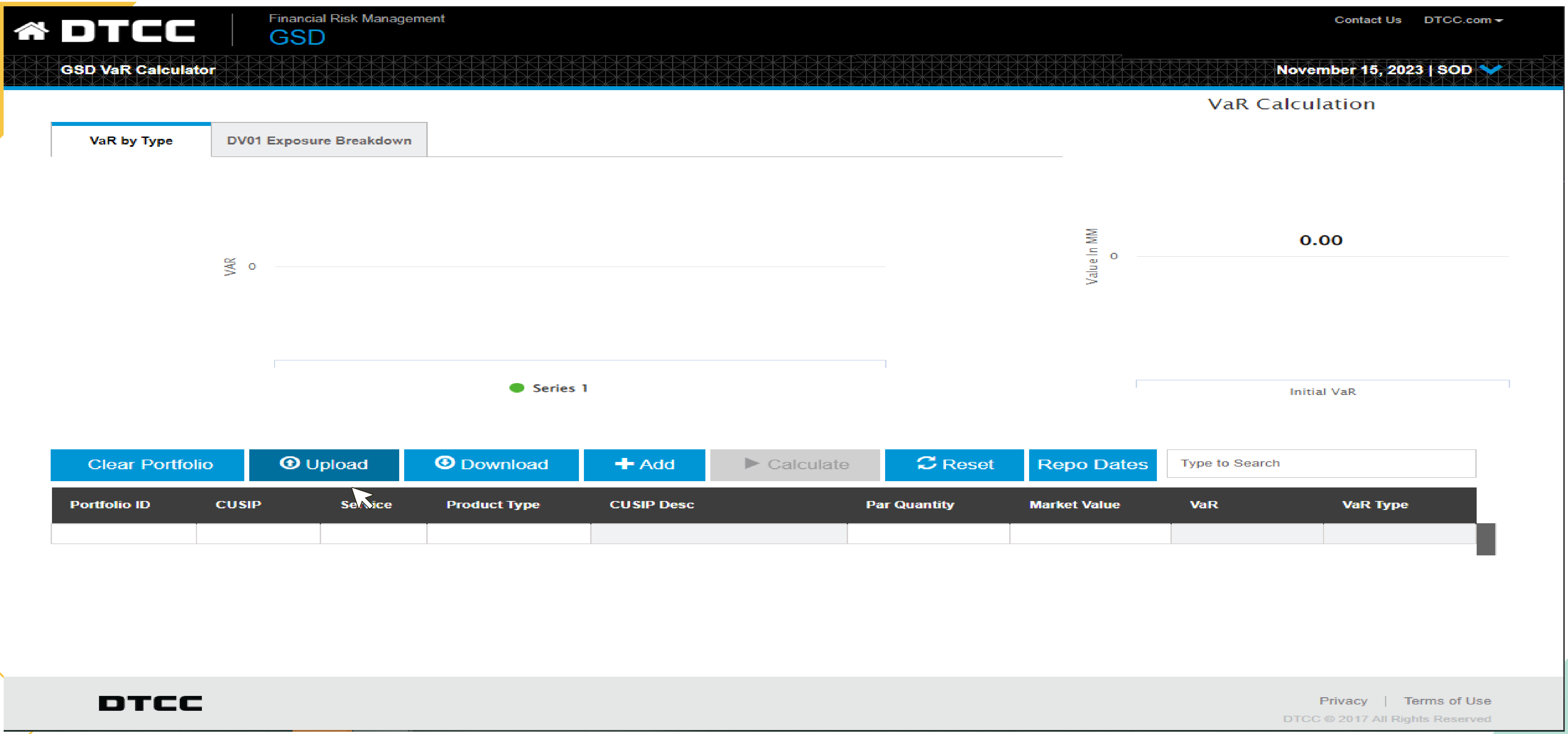
FICC-only Portfolio VaR		Pre XM VaR	Reduction Factor	Final
$60MM	Eligible	$51MM	70%	$15.3MM
	Ineligible	$12MM		$12MM

Introduction of Risk Management Tools

Risk Management Tools Available

- FICC offers a VaR calculator available through the client portal to create "what-if" portfolios and perform risk analysis.
- The GSD Clearing Fund Methodology document detailing each of the margin components is published on the DTCC U.S. Treasury Clearing website (U.S. Treasury Clearing | DTCC).
- Hourly VaR summary and CUSIP detail reports are available.
- Clearing Fund Component detail reports are also available for the Portfolio Differential and MLA Charges.
- CME Cross Margin savings reports have been enhanced to coincide with the new program launch in January.
- FICC recently made available an indicative haircut guide that allows market participants to estimate VaR charges on portfolio positions using results from FICC's production risk calculations.

FICC VaR Calculator



VaR Calculation

VaR by Type | DV01 Exposure Breakdown

VAR 0

0.00

Initial VaR

Upload csv file. File size cannot exceed 25,000 rows.

Sample Upload

Replace ○

Append ◉

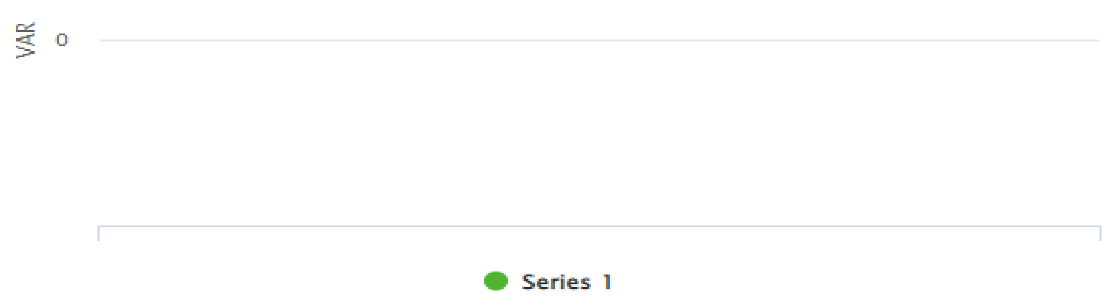
Upload Cancel

Clear Portfolio | Upload

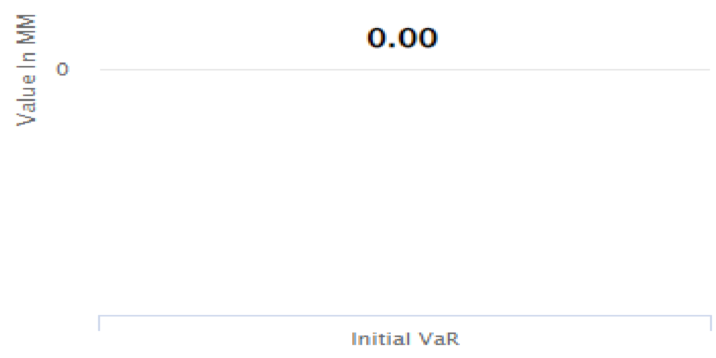
Type to Search

Portfolio ID	CUSIP	Service					VaR	VaR Type

VaR by Type | DV01 Exposure Breakdown



VaR Calculation



Clear Portfolio | Upload | Download | + Add | Calculate | Reset | Repo Dates | Type to Search

Portfolio ID	CUSIP	Service	Product Type	CUSIP Desc	Par Quantity	Market Value	VaR	VaR Type
1	91282CEV9	DVP	BOND	3.250-TNOTE-2029-06-30	(590,000,000)	(561,259,625)	8,929,592	Sensitivity
1	912828B25	DVP	BOND	0.625-TIPSNT-2024-01-15	400,300,000	523,951,864	2,664,014	Haircut
1	91282CGY1	GCF	BOND	5.525-TFRNA-2025-04-30	560,000	561,781	553	FRN Haircut
1	36179WPC6	GCF	POOL	1.500-N/A-2036-10-20	407,531	260,124	(623)	Sensitivity+Basis
1	91282CDJ7	DVP	REPO	1.375-TNOTE-2031-11-15	(122,485,000)	(96,445,288)	560,910	REPO Charge
2	91282CGP0	DVP	BOND	4.000-TNOTE-2028-02-29	(507,000,000)	(502,164,056)	5,875,468	Sensitivity

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GSD VaR Calculator | **November 15, 2023 | SOD**

VaR Calculation

VaR by Type | DV01 Exposure Breakdown

VAR 0

0.00

Initial VaR

Calculating...

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Type to Search

Portfolio ID	CUSIP	Service					VaR	VaR Type
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1	912828B25	DVP	BOND	0.625-TIPSNT-2024-01-15	400,300,000	523,951,864	2,664,014	Haircut
1	91282CGY1	GCF	BOND	5.525-TFRNA-2025-04-30	560,000	561,781	553	FRN Haircut
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GSD VaR Calculator

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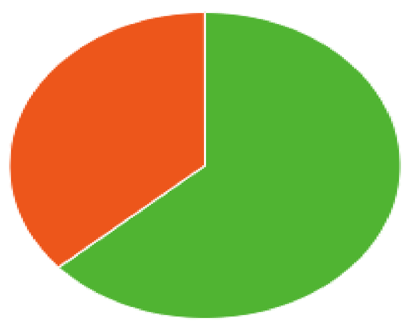
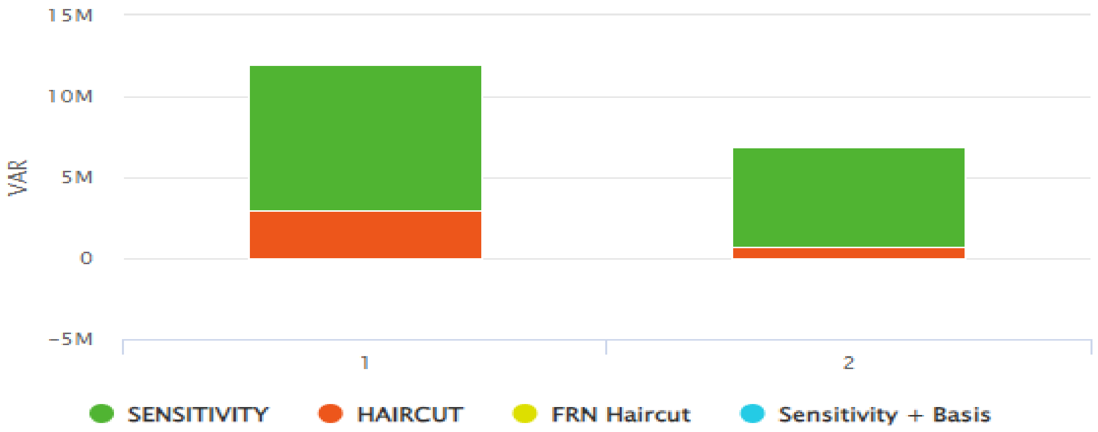
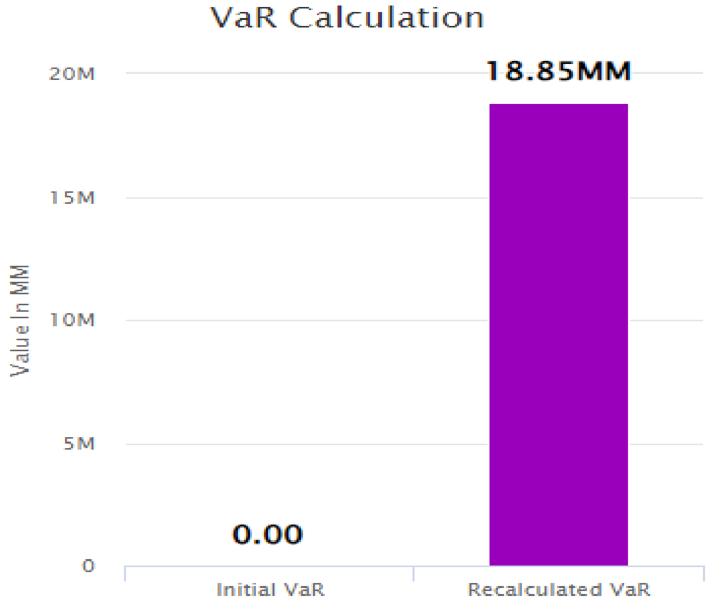
VaR by Portfolio

DV01 Exposure Breakdown







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2	91282CGP0	DVP	BOND	4.000-TNOTE-2028-02-29	(507,000,000)	(502,164,056)	6,254,783	Sensitivity
1	912828B25	DVP	BOND	0.625-TIPSNT-2024-01-15	400,300,000	523,951,864	2,986,526	Haircut
2	3133EPC60	DVP	BOND	4.625-AGENCY-2027-11-15	45,000,000	45,000,000	639,000	Haircut
1	91282CGY1	GCF	BOND	5.525-TFRNA-2025-04-30	560,000	561,781	553	FRN Haircut
2	91282CDU2	GCF	BOND	5.341-TFRNA-2024-01-31	331,400	332,170	20	FRN Haircut
2	36179WF94	GCF	POOL	2.500-N/A-2036-06-20	534,385	320,600	(552)	Sensitivity + Basis

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GSD VaR Calculator

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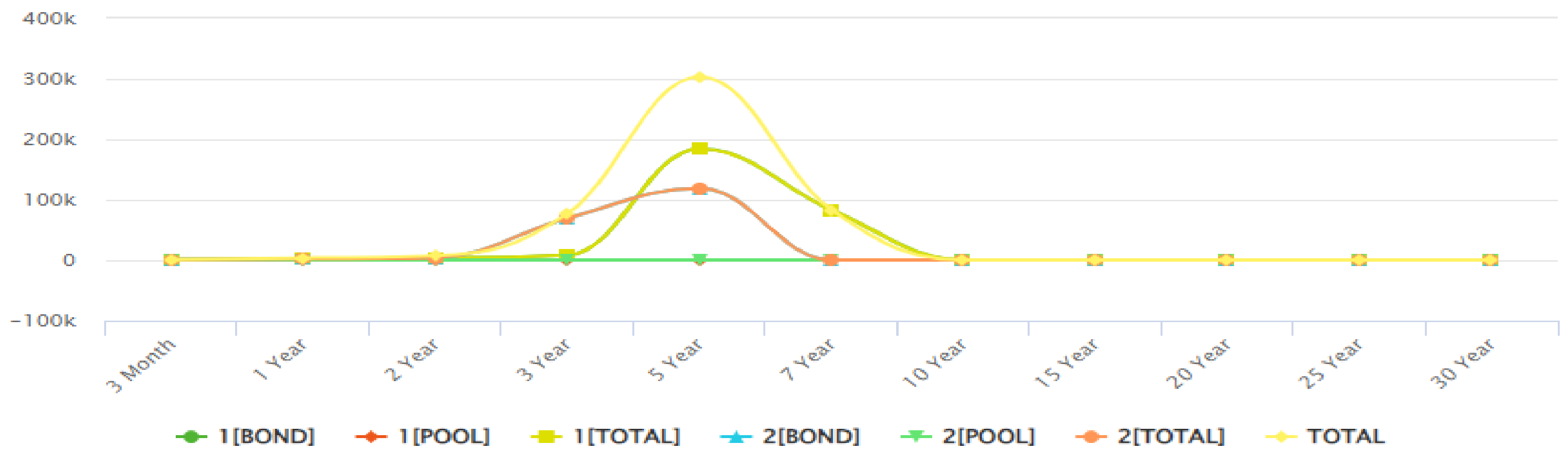
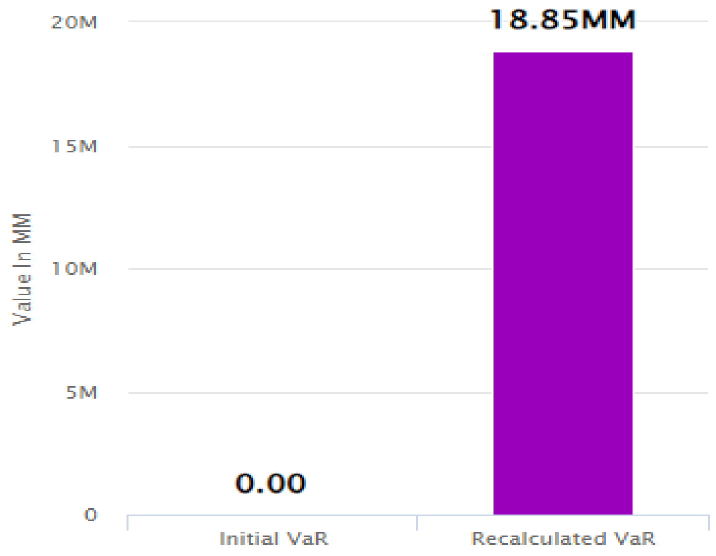
VaR by Portfolio | DV01 Exposure Breakdown



VaR Calculation



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2	36179WF94	GCF	POOL	2.500-N/A-2036-06-20	534,385	320,600	(552)	Sensitivity + Basis

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Clearing Fund Methodology and Indicative Haircut Rates

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FIXED INCOME CLEARING CORPORATION
GOVERNMENT SECURITIES DIVISION

OVERVIEW OF THE CLEARING FUND METHODOLOGY

Date: October, 2023

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FIXED INCOME CLEARING CORPORATION

GOVERNMENT SECURITIES DIVISION

SCHEDULE OF INDICATIVE HAIRCUT RATES AND RISK FACTOR RATES

December 2023

(Updated monthly)

The VaR charge is one of a number of components of a GSD Member's margin requirement to FICC, and usually comprises the largest component. For most positions, the VaR charge is based on the potential price volatility of unsettled positions using a sensitivity-based Value-at-Risk (VaR) methodology. However, for some positions with insufficient requisite data used to employ the sensitivity approach, the applicable VaR charge is determined by applying a haircut method. *This schedule is designed to be used to approximate this haircut-based VaR charge.*

NOTE: Any result obtained using the indicative haircuts rates and/or risk factor rates listed in this schedule should only be used as a general estimate of the applicable VaR charge. The degree of variation and the final, total VaR charge that a GSD Member may owe on any particular day is contingent upon its total portfolio composition.

I. To approximate VaR charges for Treasury and Agency securities

VaR charges for positions in Treasury and Agency Securities may be approximated by -

First, apply the applicable haircut rates below to the securities net exposure per benchmark index.

Benchmark Index Description	Haircut Rates (bps)
U.S. Treasury: 1-3 Year	54.20
U.S. Treasury: 3-5 Year	125.60
U.S. Treasury: 5-7 Year	167.90
U.S. Treasury: 7-10 Year	226.20
U.S. Treasury: 10-20 Year	302.60
U.S. Treasury: 20+ Year	401.30
TIPS Notes: 1-10 Year	158.30
TIPS Notes: 10+ Year	448.20

Second, where applicable, calculate the haircut from the joint correlation matrix below and the net price risk determined above for each benchmark index.

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