Fixed Income Clearing Corporation: Mortgage-Backed Securities Division

OVERVIEW OF THE CLEARING FUND METHODOLOGY

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1. EXECUTIVE SUMMARY

The Mortgage-Backed Securities Division (MBSD) is a division of the Fixed Income Clearing Corporation (FICC) that provides trade comparison, netting, risk management, settlement and central counterparty (CCP) services for the U.S. mortgage-backed securities market.

A key tool that FICC uses to manage market risk is the daily calculation and collection of Required Fund Deposits[1] from Clearing Members. The Required Fund Deposit serves as each Clearing Member's margin. The aggregate of all Clearing Members' Required Fund Deposits constitutes the Clearing Fund of MBSD, which FICC would access should a defaulting Clearing Member's own Required Fund Deposit be insufficient to satisfy losses to FICC caused by the liquidation of that Clearing Member's portfolio.

The focus of this document is to provide a high level introduction to the components of the Required Fund Deposit.

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

2. THE MORTGAGE-BACKED SECURITIES DIVISION

MBSD provides real-time automated trade matching, trade confirmation, netting and electronic pool notification to the mortgage-backed securities (MBS) market. Securities transactions processed through the MBSD include the following:

- TBA (To-Be-Announced) securities transactions,
- Options on TBAs, and
- SPTs (Specified Pool Trades).

In April 2012, the MBSD began offering the following services:

- CCP service in which the MBSD guarantees settlement of certain transactions, and
- Pool netting service whereby net pool obligations are settled versus the MBSD as CCP.

3. OVERVIEW - THE REQUIRED FUND DEPOSIT AND CLEARING FUND CALCULATION

The Required Fund Deposit addresses a potential Clearing Member's exposure through a number of risk-based component charges (as margin) calculated and assessed daily. The objective of the Required Fund Deposit is to cover the risk associated with liquidation of a Clearing Member's portfolio in the event of such Member's default. Of these components, the VaR Charge comprises the largest portion of a Clearing Member's Required Fund Deposit amount. Risk is measured based on positions and market volatilities. 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.

3.1 Portfolio Based Risk Calculation

Each Clearing Member has one or more MBSD aggregate accounts used for settlement purposes. With respect to margin calculations, Clearing Members are allowed to group aggregate accounts under the same legal entity into one or more portfolios, subject to certain restrictions and limitations. Required Fund Deposits are calculated based on the aggregate positions in each portfolio. This can potentially reduce Required Fund Deposit due to netting effect and diversification across positions held in a Clearing Member's different accounts, when combined in a portfolio.

As noted above, grouping accounts into a margin portfolio is subject to certain restrictions and limitations.[2] For example, a dealer account and a broker account cannot be grouped into the same portfolio, even though both accounts are under the same legal entity. Additionally, Clearing Members must make a single ("all or none") election regarding whether to combine all similar (e.g., dealer or broker) accounts into a single portfolio, or to maintain all of the accounts separate for purposes of the Required Fund Deposit calculations.

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

3.2 Components of the Required Fund Deposit

MBSD calculates the full suite of components that comprise the Required Fund Deposit and imposes the Required Fund Deposit once per day based on a Clearing Member's prior end-of-day positions. In addition, FICC may collect an Intraday Mark-to-Market Charge from Clearing Members to cover significant risk exposures.

[2] MBSD Rule 3, Section 10, Accounts

Component	Risk Addressed	Description
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 risk associated with the securities in a Clearing Member's portfolio on end-of-day positions ("EOD VaR") over a designated time- period. VaR assumptions include a 3-day liquidation/hedging period and a 99% confidence level, though some Member types are margined at a higher confidence level. MBS positions are combined into one portfolio, or multiple portfolios grouped by aggregate account. FICC uses historical simulation to estimate the impact of market volatilities on Clearing Member's portfolio(s). Simulated returns are based on third-party risk sensitivities and relevant risk factor time series ("sensitivities based approach")3. Static haircuts are applied to securities with insufficient data. 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, an additional period of stressed market conditions may be added to the ten-year historical data. The total EOD VaR Charge of a portfolio is the sum of VaR charge and haircut charge, floored by a percentage of the portfolio gross market amount. The floor percentage vary between 5bps – 30bps that is periodically reviewed and updated following the standard model governance process.
Bid-Ask Spread	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.
Minimum Margin Amount	Market risk of the observed positions.	The Minimum Margin Amount is used to supplement the VaR floor in order to provide a more reliable estimate of the portfolios' risk level when market conditions deviate from historical observations and would improve the responsiveness of the model to volatile market conditions due to a shorter lookback period.
Margin Liquidity Adjustment	Concentration Risk	The Margin Liquidity Adjustment Charge is only assessed when the Member's portfolio exceeds a threshold in comparison to the available market liquidity of the TBA market.
6-day Interest on Fails	Interest Exposure on failed positions	6-day Interest on Fails is assessed on failed to deliver pool/TBA positions to cover debit interest payment for the time horizon that would require MBSD to allocate the failing positions.
Backtesting Charge	Model risk	An additional charge that may be added to a Clearing Member's VaR Charge to mitigate exposures to FICC caused by settlement risks that may not be adequately captured by FICC's portfolio volatility model.

[3] To the extent that the primary source of such historical data becomes unavailable for an extended period of time, FICC shall utilize an alternative volatility calculation.

Component	Risk Addressed	Description
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 Clearing 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, with respect to each margin portfolio, is calculated by applying a multiplier to the margin portfolio's VaR Charge.
Holiday Charge	Risk related to trading activity on a Holiday.	An additional charge that may be added to Clearing 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 Clearing Member's Total Unadjusted Required Fund Deposit. **Excess Capital Premium**: equal to the Clearing Member's Excess Capital Differential multiplied by its Excess Capital Ratio. **Watch List Premium**: equal to a percentage of the Clearing Member's VaR Charge. **Special Charges**: additional deposit to mitigate specific risks that may arise from time to time

The entire Required Fund Deposit will be the greater of the sum of these charges, plus an Intraday Mark-to-Market Charge if applicable, or the Minimum Charge, which depends on membership type.

With respect to the floors and special rules, the following should be noted:

- A Minimum Charge is a floor applicable for the unadjusted Required Fund Deposit (which is the calculated requirement minus any premiums or special charges). This floor is equivalent to $100,000 for most membership types and applied to each portfolio. Pursuant to the MBSD Rules, Unregistered Investment Pools ("UIPs") Members are subject to a higher absolute floor of $1,000,000
- In addition, the confidence level assumption (used to calculate VaR) for UIP Members is set at 99.5%, which is half point higher than the targeted 99% confidence level used for other membership types.

4. VAR CHARGE (EOD VAR)

The MBSD 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 the maximum expected loss during a 3-day liquidation period is expected to be equal to or below $10,000,000, 99% of the time.

The following subsections provide the relevant details of the general methodology used to compute EOD VaR.

4.1 Historical Simulation in EOD VaR

To measure the risk of a 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 the MBSD has chosen a historical simulation approach.

As mentioned above, EOD VaR is generally computed based on the confidence level of 99% and the assumption of 3-day liquidation/hedge period. For a fixed EOD portfolio, this requires us to sample 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 portfolio containing these instruments to calculate a Profit and Loss ("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 portfolio to simulate 2500 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 assumption on the underlying P&L distribution. However, all models carry certain assumptions behind them. The basic assumption that the MBSD is making 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, MBSD determines that the historical look-back period does not contain adequate shocks, an additional period of stressed market conditions can be added to the ten year historical data. The historical stressed period chosen for the historical stressed VaR should be consistent with the historical stress scenarios applied to MBSD in DTCC's stress test. MBSD's will utilize 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.

As an example, consider the following portfolio:

CUSIP	Market Value	Agency	Coupon	Maturity	Settlement
02R032463	$2,000,000	FHLMC	3.5	15Y	June
01N050677	$1,000,000	GNMAI	5.0	30Y	July
01F032468	($3,000,000)	FNMA	3.5	15Y	June

To compute the VaR of this portfolio, MBSD needs the past 2500 days of simulated P&L returns using the vendor supplied data. The following table gives simulated results.

Simulation Day	Simulated P&L			Total P&L
	02R032463	01F032468	01N050677	
1	5,856	6,434	(10,636)	**1,654**
2	9,448	24,392	(42,660)	**(8,820)**
3	(337)	21,453	(28,587)	**(7,471)**
4	(2,894)	22,557	(22,489)	**(2,825)**
5	(4,656)	260	14,033	**9,637**
.	.	.	.	.
.	.	.	.	.
.	.	.	.	.
2496	(22,573)	2,675	(18,104)	**(38,001)**
2497	(23,051)	(2,870)	(9,021)	**(34,942)**
2498	(20,964)	3,253	(9,682)	**(27,393)**
2499	271	10,092	(12,524)	**(2,160)**
2500	1,307	22,040	(30,782)	**(7,435)**

On each simulation day in past 2500 days, the "Simulated P&L" columns compute simulated P&Ls using the vendor supplied data and the positions in the portfolio. The last column is the total simulated P&L, which is the sum of simulated P&Ls of the three CUSIPs.

For example, on simulation day 1, the market is an up market. The 15-year Freddie Mac TBA has a simulated 3-day return 0.293%. Since the portfolio has $2,000,000 long of this CUSIP, the simulated P&L is a gain of:

$$0.293\% * \$2,000,000 = \$5,856$$

…as shown on day 1 for CUSIP 02R0604A5 in the table. The simulated P&Ls for the 30-year Ginnie Mae and 30-year Fannie Mae TBA are computed similarly. The Fannie Mae TBA position incurs a loss due to its short position.

Finally, the total simulated P&L on day 1 is the sum:

$$\$5,856 + \$6,434 - \$10,636 = \$1,654$$

…resulting in a net gain of the portfolio.

The next step is to sort the Total P&L column and find the first percentile (100% minus 99%, for a 99% confidence level). The sorted results are shown below.

Sorted Order	Simulation Day	Simulated P&L			Total P&L
		02R0604A5	01N050610	01F0526A5	
2500	131	8,595	20,840	(81,783)	**(52,348)**
2499	1060	(41,246)	15,305	(21,479)	**(47,419)**
2498	2180	(5,743)	9,250	(48,851)	**(45,344)**
	.	.	.	.	.
2476	980	(28,411)	5,685	(20,869)	**(43,598)**
2475	2220	(24,536)	(4,487)	(12,972)	**(41,995)**
	.	.	.	.	.
3	124	812	(25,787)	72,685	**47,711**
2	190	(2,210)	4,832	45,219	**47,841**
1	1890	473	11,559	36,780	**48,812**

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

Denote N = 2500 for the sample size and α = 99 for the confidence level. Let k = floor (0.01(N+1) α) = 2475, and d = 0.01(N+1) α – k = 0.99.

We have $r_k = r_{2475} = -41{,}995$, and $r_{k+1} = r_{2476} = -43{,}598$.

Then, VaR = $\left(r_k + d(r_{k+1} - r_k)\right) = -\left(-41{,}995 + 0.99 * (-43{,}598 - (-41{,}995))\right) = \mathbf{43{,}581.97}$

The VaR for the portfolio is $43,581.97, representing 0.7% of the gross market value in the portfolio. The remaining subsections discuss how to compute simulated returns for different securities types.

4.2 Risk P&L Model

In order to obtain the simulated returns used in the VaR calculation, MBSD uses a sensitivity approach, where the risk profile of a clearing portfolio is decomposed and represented by the behaviors of key market risk drivers ("factors"), such as changes in interest rates. The value change of a portfolio is approximated by multiplying the change of the selected risk factors under various scenarios by the magnitude of the 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 portfolio's value to the change of a risk factor. The exposure of a position in security j of the portfolio to the i-th risk factor can be shown as:

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

Here, we assume a portfolio has N number of securities, and one of them is the security j, which has a market value of MVj, and the sensitivity of security j to the i-th risk factor is Sij. The multiplier is static and driven by how the risk sensitivity is quoted and how the risk factor change affects the P&L.

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

$$E_i^P = \sum_{j=1}^{N} (MV_j * S_{ij} * multiplier_i)$$

E_i^P constitutes the exposure vector of the portfolio P, which contains the exposure of the portfolio to each risk factor.

For example, consider the portfolio in the prior section with three positions: a 15-year Fannie Mae TBA sell position with a market value of $3 million, a 15-year Freddie Mac buy position with a market value of $2 million, and a 30-year Ginnie Mae TBA buy position with a market value of $1 million.

		(MV)	(S)	(M)	E=(S*MV*M)
TBA CUSIP	Factor Name	Market Value	Sensitivity	Multiplier	EXPOSURE
01F032468	Key Rate (10yr)	(3,000,000)	0.5339	-1	1,601,700
02R032463	Key Rate (10yr)	2,000,000	0.5795	-1	-1,159,000
01N050677	Key Rate (10yr)	1,000,000	0.0918	-1	-91,800

Each product's sensitivity to a change in the 10Y 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 portfolio's market value will change as a result of a change to the 10Y rate.

MBSD's risk P&L model is dictated by the product level return formula below:

$$Parametric\ Return = -\sum_{i}^{N} KRD_i * \Delta KR_i + \sum_{i}^{M}\sum_{j}^{M} \frac{KRC_{t_i t_j} * \Delta KR_{t_i} * \Delta KR_{t_j}}{2} - SpdDur * \Delta spd - VolDur * \Delta Vol - MtgBasisDur * MtgBasis + Timereturn$$

Where:

- KRD: Key Rate Duration
- KRC: Key Rate Convexity
- N: Number of Tenors for Duration
- M: Number of Tenors for Convexity
- VolDur: Volatility Duration
- SpdDur: Spread Duration
- MtgBasisDur: Mortgage Basis Duration
- $Timereturn$: Time return
- ΔKR: Key rate factor return
- Δspd: Spread factor return
- ΔVol: Volatility factor return
- $\Delta MtgBasis$: Mortgage basis factor return

The above formula can be easily transformed into a sum product of three components, the factor sensitivity, the factor return, and the multiplier:

$$Parametric\ Return = R = \sum_{i=1}^{M} FR_i * S_i * multiplier_i \quad (2.1)$$

…where M is the numbers of risk factors. The return of factor i is FR_i and the sensitivity to factor i is S_i. Using the risk exposure calculated above in equation 1.2, the portfolio risk P&L is calculated as:

$$Simulated\ P\&L = \sum_{i=1}^{M} E_i^P * FR_i \quad (2.2)$$

To continue the example of the sample portfolio above, if the factor for the 10Y rate changed as shown below, the market value change attributable to the move in the 10Y would be $2,277.88:

		(E)	(FR)	Scenario Date SPnL=E*FR
TBA CUSIP	Factor Name	EXPOSURE	Factor return	Simulated P&L
01F032468	Key Rate (10yr)	1,601,700	0.0064915360	10,397.49
02R032463	Key Rate (10yr)	-1,159,000	0.0064915360	-595.92
01N050677	Key Rate (10yr)	-91,800	0.0064915360	-7,523.69
				2,277.88

Additional risk factors give a more complete picture of the simulated market environment and its influence on the value of the portfolio. The 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 portfolio to each risk factor.

However, we note that MBSD's guarantee for mortgage options is limited to the intrinsic value of option positions at the time of a Clearing Member's insolvency (i.e., MBSD will pay the difference between the option's strike price and the market price of the underlying TBA at the time of insolvency in cash to counterparties of in-the-money options only). As such, the value change of an option position is simulated as the difference of the intrinsic values between the calculation date and the liquidation date. The intrinsic value as of the liquidation date is in turn calculated based on the simulated price of the underlying TBA as of the liquidation date.

4.3 Haircuts

Occasionally, portfolios contain classes of securities that reflect market price changes not consistently related to historical risk factors. In an effort to ensure that all positions are accounted for in measuring the portfolio's risk, MBSD 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.

Currently, only balloon TBAs such as Fannie Mae 7Y balloons, Freddie Mac 5Y balloons and Freddie Mac 7Y balloons fall into this category. These products are eligible for clearing at MBSD but have limited trading activity and insufficient market data to be incorporated into the model. FICC will compute the VaR Charge for these securities by applying static haircut levels to gross positions.

Any static haircut based charges are added to the VaR computed by historical simulation. The result is the EOD VaR that is subject to a floor based on the gross market value of the portfolio in order to prevent an unreasonable calculation that could result from the receipt of an erroneous price and other unexpected conditions.

4.4 Bid-Ask Spread

For each MBSD portfolio, the positions are segmented into one asset-group and the bid-ask charge is calculated as follows:

$$Bid\text{-}Ask\ Charge = \sum_{g \in TBA} GMV_g \cdot HC_g$$

GMV_g is the gross market value of all TBA securities, that is the sum of the gross market value of each netted position in the portfolio. HC_g is the bid-ask haircut rate of TBAs.

4.5 Minimum Margin Amount

The Minimum Margin Amount is calculated at the portfolio level and consists of the sum of:

(1) the absolute value of the net position across all products multiplied by a outright risk factor, and

(2) the absolute value of the net position in each product and securitization program multiplied by a respective risk factor, to determine the amount of the charge.

The risk factor is calculated using historical market prices of benchmark TBA securities for each securitization program bucket which may be periodically recalibrated for a lookback period between 1 and 3 years. The outright risk factor is the risk factor that applies to the absolute value of the net position across all products determined by whether CONV30 or GNMA30 comprises the larger absolute net position of the portfolio, with the risk factor of the larger securitization program prevailing.

The securitization programs are grouped as follows:

- CONV30: 30-year mortgage-backed securities issued by Fannie Mae or Freddie Mac.
- GMNA30: 30-year mortgage-backed securities issued by Ginnie Mae, including GNMA, GNMAII, and Jumbos.
- CONV15: 10-, 15-, and 20-year mortgage-backed securities issued by Fannie Mae or Freddie Mac.

GNMA15: 15-year mortgage-backed securities issued by Ginnie Mae, including GNMA and GNMAII.

The formula can be summarized as follows:

(Outright risk factor*Absolute value of portfolio net position)

+ (CONV30 risk factor*Absolute value of CONV30 net position), if GNMA30 is used for basis risk factor

+ (GNMA30 risk factor*Absolute value of GNMA30 net position), if CONV30 is used for basis risk factor

+ (CONV15 risk factor*Absolute value of CONV15 net position)

+ (GNMA15 risk factor*Absolute value of GNMA15 net position)

Minimum Margin Amount

To illustrate the calculation, consider an example where a Member has a portfolio with a net long position across all products of $2BN and CONV30 constitutes the larger absolute market value in the portfolio between CONV30 and GNMA30.

Assume that the outright risk factor for CONV30 is 0.0096, the risk factor for GNMA30 is 0.005, the risk factor for CONV15 is 0.006, and the risk factor for GNMA15 is 0.007.

Also assume that the portfolio has a $500MM net short position in GNMA30, a $30MM net short position in CONV15, and a $120MM net long position in GNMA15.

The Minimum Margin Amount would be calculated as $22.72MM.

Outright Risk	$(0.0096 * \$2BN)$
GNMA30	$+ (0.005 * \$500MM)$
CONV15	$+ (0.006 * \$30MM)$
GNMA15	$+ (0.007 * \$120MM)$
Minimum Margin Amount	$22.72MM

* “EOD_MMASummary” report in RTTM details the daily risk factors and portfolio breakdown on a daily basis.

5. MARGIN LIQUIDITY ADJUSTMENT

The MBSD MLA charge applies to concentrated positions of Agency MBS TBAs. The charge depends on the level of the concentration relative to the market depth and the market volatilities.

MBSD segments the relevant markets into one asset group - Agency MBS TBAs.

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 the asset group and comparing the impact cost to the core change allocated to the asset group.

When the ratio of the impact cost to the allocated core change exceeds the threshold, MLA charge will be assessed for the 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.

The calculation of the impact cost has two components. 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 the asset group. The second component is basis cost that is a function of the gross market value, market depth parameter, and basis volatility parameters.

6. 6-DAY INTEREST ON FAILS

6-day Interest on Fails charge is designed to cover the interest payment exposure of the approximate time to allocate the failing pools and TBA positions, which is set at 6-days.

7. BACKTESTING CHARGE

The objective of the Backtesting Charge is to increase the Required Fund Deposit for Clearing Members that are likely to experience backtesting deficiencies by an amount sufficient to maintain such Clearing Member's backtesting coverage above the 99% confidence threshold.

FICC employs daily backtesting to determine the adequacy of each Clearing Member's Required Fund Deposit. FICC compares the Required Fund Deposit for each Clearing Member with the simulated liquidation gains/losses using the actual positions in the Clearing Member's portfolio, and the actual historical security returns. FICC investigates the cause(s) of any backtesting deficiencies.

As a part of this investigation, FICC pays particular attention to Clearing Members with backtesting deficiencies that bring the results for that Clearing Member 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 Clearing Members may experience backtesting deficiencies for the same underlying reason.

Because the settlement activity and size of the backtesting deficiencies varies among impacted Clearing Members, FICC must assess a Backtesting Charge that is specific to each impacted Clearing Member. To do so, FICC examines each impacted Clearing Member'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 presumptive Backtesting Charge amount equals that Clearing Member's third largest historical backtesting deficiency, subject to adjustment as further described below.

The Backtesting Charge is imposed on a daily basis for a one-month period. This charge is only applicable to those Clearing Members whose overall 12-month trailing backtesting coverage falls below the 99% coverage target. Although the third largest historical backtesting deficiency for a Clearing Member 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 Clearing Member is likely to experience future backtesting deficiencies and the estimated size of such deficiencies.

8. VOLATILITY EVENT CHARGE

The Volatility Event Charge is designed to provide a proactive mechanism to complement MBSD'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 MBSD, for periods in which markets are heavily influenced by anticipation and resolution of a scheduled event.

The Volatility Event Charge is assessed once a day at MBSD 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[4] 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.

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

9. HOLIDAY CHARGE

The Holiday Charge approximates the exposure that a Clearing Member's trading activity on the applicable Holiday 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.

Clearing Members 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 the Holiday Charge. The charge is collected on the Business Day prior to the applicable Holiday and removed from the Required Fund Deposit on the Business Day following the Holiday.

10. SPECIAL CHARGE

In order to mitigate exposure from certain market conditions and other financial and operational capabilities of a Member, MBSD 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 Clearing Member.

11. OTHER CHARGES

MBSD applies a premium charge to Clearing Members in instances where the calculated Required Fund Deposit, specifically the sum of each EOD VaR applicable to the Clearing Member's activity, 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 Netting Members of the Government Securities Division of FICC.

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

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

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

12. INTRADAY MARGIN CHARGES

FICC risk systems monitor intraday volatility and mark-to-market exposures on an hourly 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 hourly intervals between the hours of 8:00 am to 4:00 pm. However, FICC maintains authority and operational capacity to collect intraday margin charges at any time during the system monitoring window if circumstances warrant.

12.1. Intraday Mark-to-Market Charge

MBSD calculates the full suite of components that comprise the Required Fund Deposit and imposes the Required Fund Deposit once per day, at the start of the day, based on a Clearing Member's prior end-of-day positions. During each trading day, a Clearing Member's exposure may change due to intraday changes to position and market value in the Clearing Member's portfolio that result in an adverse change to the Clearing Member's Mark-to-Market ("MTM Exposure").

FICC manages this intraday risk exposure by observing snapshots of Clearing Members' portfolios and monitoring intraday changes to each Clearing Member's Mark-to-Market versus the Mark-to-Market that was part of the Required Fund Deposit at the start of the day or, if applicable, any subsequently collected Mark-to-Market amount. FICC then collects an Intraday Mark-to-Market Charge from Clearing Member to cover significant risk exposures that warrant the collection of intraday margin, as further described below.

Assessment of the Intraday Mark-to-Market Charge entails tracking three criteria (each, a "Parameter Break") for each Clearing Member. The Parameter Breaks help FICC determine whether a Clearing Member's MTM Exposure poses a risk to FICC that is significant enough to warrant an Intraday Mark-to-Market Charge.

The objective of the Parameter Breaks is to ensure that FICC is able to limit exposure to intraday Mark-to-Market fluctuations that

1. are of a large dollar amount (the "Dollar Threshold" amount of $1,000,000, as compared to the Clearing Member's start-of-day Mark-to-Market requirement including, if applicable, any subsequently collected Mark-to-Market amount), and
2. exhaust a significant portion of a Clearing Member's VaR Charge (the "Percentage Threshold" of 30% as compared to the daily VaR Charge)

If a Clearing Member's MTM Exposure breaches all Parameter Breaks, the Clearing Member will be subject to the Intraday Mark-to-Market Charge and FICC will collect the charge subject to waivers or changes to the amount of the calculated charge, as described below.

During certain market conditions, FICC may reduce the Dollar Threshold and Percentage Threshold.

Examples of market conditions that FICC may consider with respect to reducing the Intraday Mark-to Market Charge include, but are not limited to (1) sudden swings in mortgage-backed securities spreads outside of historically observed market moves or (2) market volatility that results in elevated levels of exposure that, in aggregate, materially exceed those amounts observed under normal market conditions.

Although FICC generally collects the Intraday Mark-to-Market Charge under the conditions described above, FICC retains the discretion to waive or alter such Intraday Mark-to-Market Charge in circumstances where it determines that the MTM Exposure and/or the breaches of the Parameter Breaks do not accurately reflect FICC's risk exposure to the Clearing Member's intraday Mark-to-Market fluctuation. For example, a Clearing Member's breach of the Parameter Break is based on a large Mark-to-Market fluctuation arising out of trade errors or when there is demonstrated margin sufficiency in covering a Clearing Member's risk, for example, a Clearing Member whose Backtesting Coverage is 100% and has 100 or more trading days.

Based on FICC's assessment of the impact of these circumstances and FICC's actual risk exposure to a Clearing Member, FICC may, in its discretion, waive or alter (decrease or increase) an Intraday Mark-to-Market Charge for a Clearing Member. Such Intraday Mark-to-Market Charge would not reduce a Clearing Member's Required Fund Deposit below the amount reported at the start of day, and any increase would not cause the Intraday Mark-to-Market Charge to be greater than two times its calculated amount.

12.2 Intraday VaR Charge

Intraday VaR is determined based on MBSD's observation of a Clearing Member'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").

The Intraday VaR Charge is designed to mitigate exposure to MBSD that results from large fluctuations in a Clearing Member's Portfolio due to new and settled trade activities that are not otherwise covered by a Clearing Member's recently collected Required Fund Deposit. FICC determines whether to assess an Intraday VaR Charge by tracking two criteria (each, a "Parameter Break") for each Clearing Member. The first Parameter Break evaluates whether a Clearing Member's Intraday VaR Charge equals or exceeds a set dollar amount (as determined by FICC from time to time). The second Parameter Break evaluates whether the Intraday VaR Charge equals or exceeds a percentage increase (as determined by FICC from time to time) of the VaR Charge that was included in the most recently collected Required Fund Deposit including, if applicable, any subsequently collected Intraday VaR Charge (the "Percentage Threshold"). Intraday VaR Charge is assessed on Clearing Member's portfolio that has an increase greater than $1,000,000, and subject to Thresholds as further detailed below.

12.2.1 The Dollar Threshold

The purpose of the Dollar Threshold is to identify Clearing Members with additional risk exposures that represent a substantial portion of the Clearing Fund. FICC believes these Clearing Members pose an increased risk of loss to MBSD because the coverage provided by the Clearing Fund (which is designed to cover the aggregate losses of all Clearing Members' portfolios) would be substantially impacted by large exposures. In other words, in the event that a Clearing Member's Required Fund Deposit is not sufficient to satisfy losses to MBSD caused by the liquidation of the defaulted Clearing Member's Margin Portfolio, FICC will use the Clearing Fund to satisfy such losses. However, because the Clearing Fund must be available to satisfy potential losses that may arise from any Clearing Member's defaults, MBSD will be exposed to a significant risk of loss if a defaulted Clearing Member's additional risk exposure accounted for a substantial portion of the Clearing Fund.

Currently, the Dollar Threshold equals a change in a Clearing Member's Intraday VaR Charge that equals or exceeds $80,000,000 during normal market and $30,000,000 if volatile market condition were to be invoked. On an annual basis, FICC assesses the sufficiency of the Dollar Threshold, and may adjust the Dollar Threshold if FICC determines that an adjustment is necessary to provide MBSD with reasonable coverage.

12.2.2 The Percentage Threshold

The purpose of the Percentage Threshold is to identify Clearing Members with Intraday VaR Charge amounts that reflect significant changes when such amounts are compared to the VaR Charge that was included as a component in such Clearing Member's most recently collected Required Fund Deposit. FICC believes that these Clearing Members pose an increased risk of loss to MBSD because the most

recently collected VaR Charge (which is designed to cover estimated losses to a Margin Portfolio over a three-day liquidation period at least 99 % of the time) may not adequately reflect a Clearing Member's Margin Portfolio with such Clearing Member's significant intraday changes in additional risk exposure. Thus, in the event that the Clearing Member defaults during the trading day the Clearing Member's most recently collected Required Fund Deposit may be insufficient to cover the liquidation of its Margin Portfolio within a three-day liquidation period.

Currently, the Percentage Threshold is equal to a Clearing Member's Intraday VaR Charge that equals or exceeds 100% of the most recently calculated VaR Charge included in the most recently collected Required Fund Deposit including, if applicable, any subsequently collected Intraday VaR Charge. On an annual basis, FICC assesses the sufficiency of the Percentage Threshold and may adjust the Percentage Threshold if it determines that such adjustment is necessary to provide MBSD with reasonable coverage.

FICC has the discretion to not to collect or decrease Intraday VaR Charge amounts if it determines that a Clearing Member's additional risk exposure and/or breach of a Parameter Break does not accurately reflect MBSD's exposure to the fluctuations in the Clearing Member's Margin Portfolio. Given that there are numerous factors that could result in a Clearing Member's additional risk exposure and/or breach of a Parameter Break, FICC believes that it is important to maintain such discretion in order to help ensure that the Intraday Supplemental Fund Deposit is imposed only on Clearing Members with additional risk exposures that pose a significant level of risk to FICC. Examples of circumstances that FICC may consider with respect to the determination not to collect or reduce Intraday VaR Charge amounts may include, but shall not be limited to, (i) changes in portfolio composition result in the threshold amount not being breached on a consistent or persistent basis, (ii) trades that will be offset by trades submitted later in the day, (iii) the threshold amount was breached due to the submission of erroneous trades that are being corrected, or (iv) the threshold amount was breached due to erroneous data inputs.

FICC may waive the collection of an Intraday VaR Charge 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 Member without the collection of the Intraday VaR Charge.

12.3 Intraday Margin Charges under Volatile Market Conditions

FICC may require additional amount of intraday margin charges under 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 the Corporation that, in aggregate, materially exceed intraday risk exposures observed under normal market conditions.FICC provides tools, as discussed in the section below, to allow a Member to hypothesize trades to demonstrate impact to Required Fund Deposits. The FICC Risk Reporting portal can also be used by Members to track and understand Required Fund Deposits.

13. MEMBER TOOLS AND GUIDES

FICC provides Members with provides 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 use guides which can be found here.

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This Document should not be regarded as a definitive or exhaustive description of FICC/MBSD's services or risk-management framework; nor should it be regarded as a substitute for the Clearing Rules, which govern in all respects, the relationship between FICC/MBSD and its members. In all cases, members should refer to the Clearing Rules for a complete statement of MBSD procedures, obligations, and requirements. Nothing in this Document shall be deemed to impose any obligations on FICC/MBSD that are not set forth in the Clearing Rules, and in the case of any discrepancy between this Document and the Clearing Rules, the Clearing Rules shall govern.

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