

THE CLEARING CORPORATION OF INDIA LTD.

Risk Management Department

Consultation Paper

Securities Segment: Enhancements in Initial Margin Model

1. Introduction

1.1 Clearing Corporation of India Limited (CCIL) acts as a Central Counterparty (CCP) for all secondary market transactions (outright, market repo and triparty repo) in Government Securities. As a central counterparty, CCIL's key function is to reduce counterparty credit risk for its Members. It achieves this through its risk management processes in such a manner that the risk to its members is either eliminated or reduced to the minimum. In Jan'14, the Reserve Bank of India granted CCIL the status of a Qualified Central Counterparty (QCCP) in the Indian jurisdiction. As a QCCP, CCIL adheres to the Principles for Financial Market Infrastructures (PFMIs) issued by the Committee on Payments and Market Infrastructures (CPMI) and International Organisation of Securities Commissions (IOSCO).

1.2 PFMI Principle 6, 'Margin' states that a *"CCP should cover its credit exposures to its participants for all products through an effective margin system that is risk-based and regularly reviewed"*. Key Consideration 7 of this Principle requires a CCP to regularly review and validate its margin models.

1.3 CCIL reviews its margin models periodically. Based on the latest review, a couple of enhancements in Initial Margin (IM) model in Securities segment (outright and market repo trades) are being proposed. Apart from IM in Securities segment (outright and market repo trades) the proposed enhancements are likely to impact the haircut of securities contributed in Settlement Guarantee Fund (SGF), Default Fund (DF) and Triparty Repo collateral as these are derived from VAR based margin factors.

1.4 The proposed enhancements pertain to changes in the parameters of Value at Risk (VAR) model which is used to determine IM of outright and market repo trades. These enhancements will strengthen the risk management process for this segment.

2. Current approach for computing Initial margins for outright and market repo trades

CCIL collects Initial Margin (IM) to cover the likely risk from future adverse movement in the prices of the securities cleared by it. For the same reason, haircuts are charged on securities accepted by it as deposits towards SGF. The current approach is summarized below.

2.1 Initial Margin in the Securities Segment is computed based on a security-wise Value at Risk (VAR) with a 3 day Margin Period of Risk (MPOR) at 99% confidence level. VAR is arrived at using historical simulation with a look back period of 1000 days. A factor of 0.25% is added towards the coverage of coupon accrual between the date of trade and the date of closure. The margin factors of semi-liquid and illiquid securities are stepped up using illiquidity multiplicands.

2.2 One (1 day) VAR used for margin factor / haircut computation process has a built in anti-cyclical measures in the form of a volatility component (a supplementary charge on the margin factors) and a floor that is a minimum value below which the 1 day VAR are not allowed to fall. This ensures that when the historical look back period comprises less volatile data points, the VAR based numbers are automatically set at higher levels.

2.3 Moreover, in order to ensure that these measures do not over-adjust 1 day VAR there is a ceiling to which the 1 day VAR can be adjusted upwards by the volatility component.

2.4 Presently the values of the relevant parameters are as under:

- i. Adjustment for Volatility component is 50% of the 1 day VAR based factor.
- ii. The floor value (of 1 day VAR) for all securities falling in a particular tenor bucket is set at the volatility component adjusted 75th percentile minimum value obtained from the 10 years historical database of 1 day VAR values for securities whose residual maturities fall in the tenor bucket.
- iii. Ceiling for the adjusted 1 day VAR is the highest value from the 10 years historical database of unadjusted 1 day VAR values for securities classified in various tenor

buckets. Thus any upward adjustment done to the margin factors of the current period is acceptable so long as it doesn't result in the margin factors exceeding the historical maximum VAR value for that tenor bucket.

2.5 The anti-cyclical measures were implemented in Dec'16. Subsequently, the parameters values were revised in Sept'18. Links to related Notifications issued to members are listed in Section -5 (References).

3. Proposed Enhancements

3.1 Review of Margin Period of Risk (MPOR)

3.1.1 Explanatory Note 3.6.7 to PFMI Principle 3 (Margins) mentions the following about the "Close-out" period in a margining model. It states that:

"A CCP should select an appropriate close-out period for each product that it clears and document the close-out periods and related analysis for each product type. A CCP should base its determination of the close-out periods for its initial margin model upon historical price and liquidity data, as well as reasonably foreseeable events in a default scenario. The close-out period should account for the impact of a participant's default on prevailing market conditions. Inferences about the potential impact of a default on the close-out period should be based on historical adverse events in the product cleared, such as significant reductions in trading or other market dislocations. The close-out period should be based on anticipated close-out times in stressed market condition".

3.1.2 The margin period of risk (MPOR) is set at 3 days on the basis of the assumption that in the event of a default in securities segment, the counter-value withheld from defaulting member (INR cash or government securities) and the securities deposited as margins in the SGF can be disposed within 3 days.

3.1.3 MPOR of 3 days for Securities segment (outright and market repo trades) has been in place since 2002. There has not been a single instance in CCIL's history wherein sale of all the securities (i.e. counter value or/ and margin/ collateral) of a member has been resorted to.

3.1.4 Based on market depth and liquidity of securities in the secondary market, we are of the opinion that the margin period of risk (MPOR) of 3 days in the VAR model is on the lower side. We are proposing that MPOR be increased from 3 days to 5 days.

3.1.5 Incidentally, the securities deposited as collateral for Triparty repo clearing (as also the Securities contributed in Default Fund) are already being subject to VAR based haircuts calculated with a MPOR of 5 days. This has been so from the time the erstwhile CBLO was introduced in 2003. Increasing the MPOR in the Securities segment for outright and market repo trades to 5 days will therefore bring uniformity in the MPOR across all the three types of government securities trades being cleared by CCIL.

3.2 Review of Floor for 1 day VAR in tenor buckets

3.2.1 Explanatory Note 3.6.10 to PFMI Principle 3 (Margins) mentions the following as a good practice to limit procyclicality in CCP's margining models. It states that:

“A CCP should appropriately address procyclicality in its margin arrangements. To the extent practicable and prudent, a CCP should adopt forward-looking and relatively stable and conservative margin requirements that are specifically designed to limit the need for destabilising, procyclical changes.”

CCIL has incorporated anti-cyclical measures in the 1 day VAR, viz. volatility component (a supplementary charge on the margin factors currently set at 50%) and a floor. The floor value (of 1 day VAR) for all securities falling in a particular tenor bucket is set at the volatility component adjusted 75th percentile minimum value (i.e. 25th percentile * 1.5) obtained from the last 10 years historical dataset of 1day VAR values for securities whose residual maturities fall in the tenor bucket.

3.2.2 An analysis of floor for 1 day VAR over the last couple of years in various tenor buckets¹ is shown in the graph below.

¹ The number of tenor buckets is 10. For easy readability, we have shown 1 day VAR floor in the last 2 years for 6 tenors in the graph.

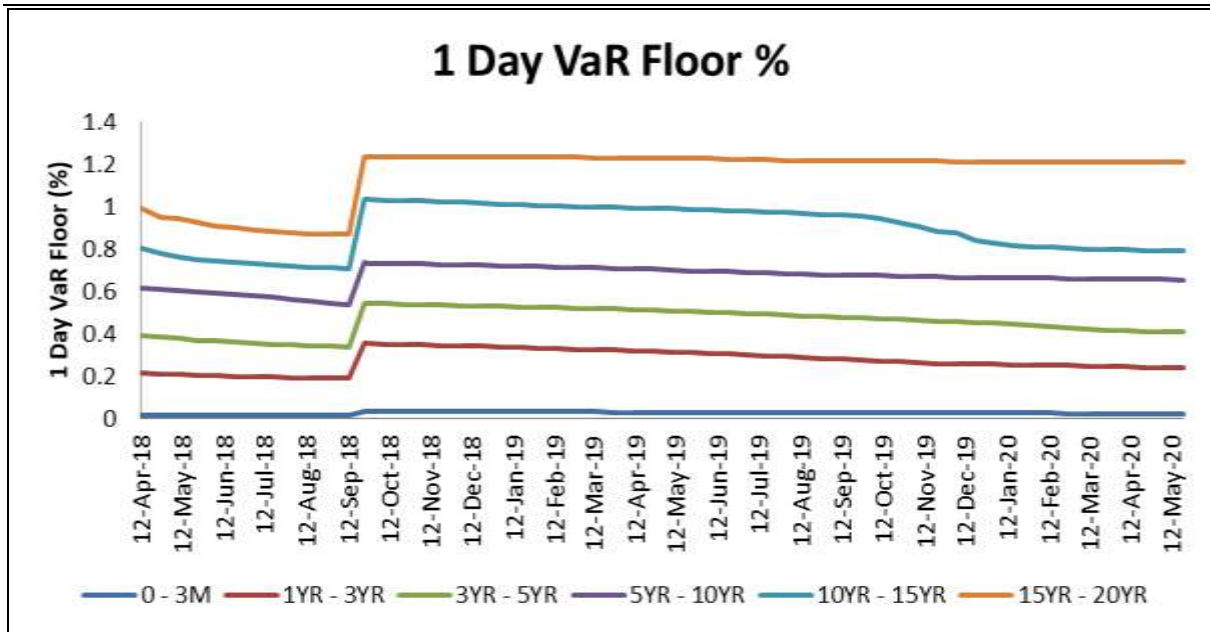


Figure 1: 1 day VAR Floor for 6 tenor buckets in last 2 years (computed on Reporting Fridays)

As is evident from the graph above, there has been a gradual downward trend in the floor for 1 day VAR over time in all the tenor buckets.

3.2.3 Consequently, we observe a similar trending down of Margin factors in various maturities. The graph below compares 1 day VAR and Margin factor of 10 year benchmark security over the years.

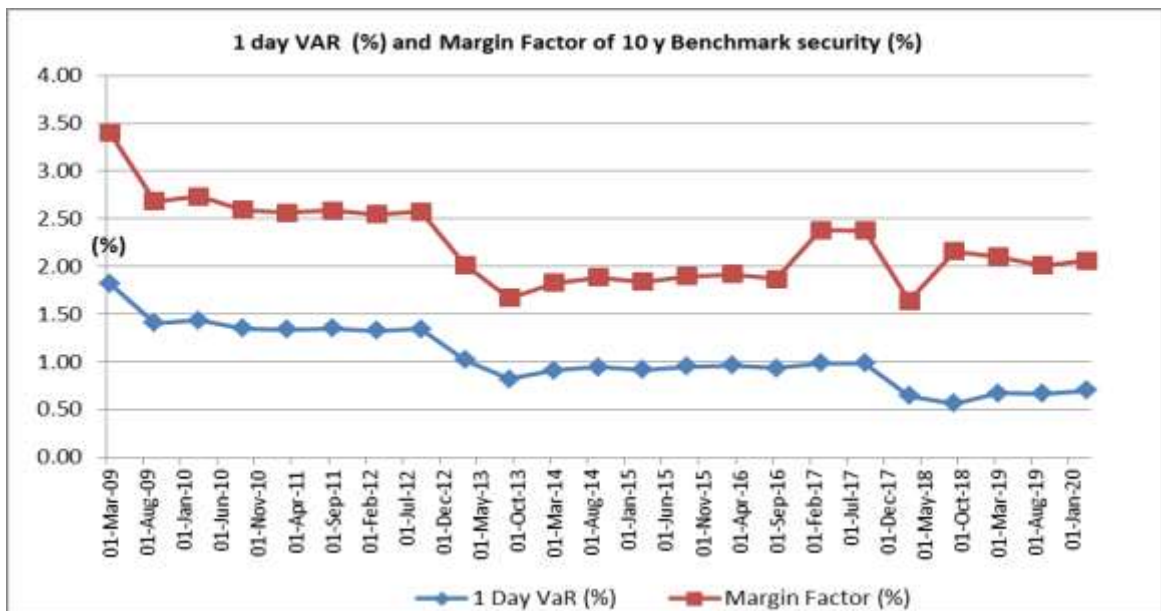


Figure 2: 1 day VAR and Margin Factor of 10 year Benchmark Government Security

3.2.4 Floor for 1 day VAR as a percentage of highest 1 day VAR in tenor buckets with percentiles computed from last 10 years of historical data is given in the table below (as computed on reporting Friday, 19th Jun 2020) :

	0 - 3M	3M - 6 M	5YR - 10YR	10YR - 15YR	15YR - 20YR
Max 1 day VAR	0.1456	0.221	1.4725	2.0508	2.1356
Min 1 day VAR	0.0011	0.0308	0.3667	0.4865	0.7438
Since Dec 2016 to Sept 2018					
1 day VAR Floor = 5 th percentile	0.0066	0.0385	0.4655	0.6692	0.8025
VC Adjusted 1 day VAR Floor = 5 percentile *1.25	0.0083	0.0481	0.5819	0.8365	1.0031
VC Adjusted FLOOR as % of (Max 1 day VAR)	5.70%	21.80%	39.50%	40.80%	47.00%
Since 24 th Sept 2018					
1 day VAR Floor = 25 th percentile	0.021	0.0525	0.652	0.7915	1.1815
VC Adjusted 1 day VAR Floor = 25 percentile * 1.5	0.0315	0.0788	0.978	1.1873	1.7723
VC Adjusted 1 day VAR Floor as % of (Max 1 day VAR)	21.60%	35.70%	66.40%	57.90%	83.00%

Table 1: Volatility Adjusted 1 day VAR Floor in tenor buckets (as computed on 19th Jun 2020) as percentage of highest 1 day VAR with current and past model parameters

The above table indicates that with the model parameters in place till Sept 2018, volatility component adjusted 1 day VAR floor was approximately 15% of the highest 1 day VAR in lower tenor buckets (viz. 0-3 months, 3 months -6 months) on an average. With the revised parameters implemented since 24th Sep 2018, volatility component adjusted 1 day VAR floor is only slightly higher at 30% of highest 1 day VAR in lower tenor buckets (viz. 0-3 months, 3 months - 6 months) on an average.

3.2.5 The above analysis suggests that 1 day VAR floor needs to be calibrated to a higher percentile of 1 day VAR historical data to act as an effective pro cyclicity mitigant. This premise is supported by the fact that since Sep'18 (when the parameter values were set at their current levels), Volatility Margin (VM) was imposed on 12 days. While 25% VM was imposed on 9 days, 50% VM was imposed on 2 days and 75% VM was imposed on 1 day. Volatility Margin is akin to a temporary increase in IM when a sudden increase in market volatility renders the Initial Margin inadequate to cover the increased exposure on outstanding positions. Frequent impositions of Volatility margin indicate that the initial margin model is becoming procyclical.

- 3.2.6 It is therefore proposed to address this limitation by re-calibrating the floor to the 1 day VAR floor in various tenor buckets to the 95th percentile value of 1 day VAR historical data set in tenor buckets instead of 25th percentile value hiked up by volatility component of 50% as is the current practice. Our analysis shows that if the proposed model was in place since Sept 18, VM of 25% would have been imposed for 2 days while VM of 50% would have been imposed for 1 day only. Thus, we see that the instances and quantum of VM imposed in Securities segment would have come down with the proposed changes.
- 3.2.7 In this context, it may be noted that the 95th percentile 1 day VAR in the 10 year history would most likely have arisen when the corresponding look back period included stress data points. Re-calibration of the floor parameter to the 95th percentile will therefore be akin to implementing stressed VAR in this segment. Incidentally, stressed VAR is already in place in CCIL for derivative products like Rupee IRS and Forex Forward. By ensuring that the impact of stress period returns is always incorporated in the IM model, the proposed revision will make the IM model in Securities segment consistent with IM models in Forex Forward and Rupee Derivatives Segments.
- 3.2.8 The securities deposited as collateral for SGF/ Triparty repo / Default Fund are subject to VAR based haircuts. The proposed enhancements in this paper envisages a change in computation of 1 day VAR floor for various tenor buckets which is likely to change the values of 1 day VAR for securities and consequently the haircut rates for securities deposited as collateral in SGF/ Triparty repo/ Default Fund.

4.0 Summary

The proposed enhancements to the margining model of Securities Segment are summarized below:

- a) Increase in Margin period of Risk (MPOR) in Securities segment (outright and repo) from 3 days to 5 days.

- b) Floor for 1 day VAR for securities in a tenor bucket to be calibrated to 95th percentile 1 day VAR values as against the current practice of calibrating it to 25th percentile 1 day VAR hiked by volatility component of 50%, with percentiles derived from last 10 years of historical data of 1 day VAR.

5.0 References

- a) Enhancements to the approach followed for computation of Margin Factor/ Hair Cut Rates (Notification Dated: 1st Nov 2016; RMD/ SS/16/58; Implementation Date:5th Dec 2016)

https://www.ccilindia.com/Lists/1stRMD_SpecificNotification/Attachments/130/28.%20RMDSS1658_Computation%20of%20Margin%20Factors%20HC%20Rates_011116.pdf

- b) Enhancements to the approach followed for computation of Margin Factor/ Hair Cut Rates (Notification Dated: 21st Aug 2018; RMD/ SS/18/75: Implementation Date; 24th Sep 2018)

https://www.ccilindia.com/Lists/1stRMD_SpecificNotification/Attachments/147/RMDSS1875%20Enhancement%20to%20Computation%20of%20Margin%20Factors%20%20HC%20Rates.pdf

Members are requested to send their comments and feedbacks on the proposals as detailed above. The feedback may be sent by email to us latest by **18th July 2020** at rmd@ccilindia.co.in for attention of Chief Risk Officer, CCIL with Subject line as: “*Consultation Paper :Securities Segment - Enhancements in Initial Margin Model*”.

If any clarification is required on any aspect of this paper, please feel free to contact Mr. STP Venugopal, AVP, Risk Management Dept. at 61546413 or Mr. Nandan Pradhan, AVP, Risk Management Dept.
