

## **Composition and Contributions to Core Settlement Guarantee Fund**

SEBI vide its circular no. CIR/MRD/DRMNP/25/2014 dated August 27, 2014 has issued norms related to Core Settlement Guarantee Fund (Core SGF), Stress Testing and Default Procedures for Cash Market segment, Futures and Options segment and Currency Derivatives segment. SEBI further vide its circular no. SEBI/HO/CDMRD/DRMP/CIR/P/2018/111 dated July 11, 2018 has specified that clearing corporations clearing commodity derivatives transactions shall also comply with the provisions of the SEBI circular dated August 27, 2014. In addition to the above provisions, SEBI vide circular no. SEBI/HO/MRD/MRD-PoD-2/P/CIR/2024/131 dated October 01, 2024, has laid down additional guidelines regarding Stress Testing Framework in Equity Derivatives Segment to determine the corpus of Core Settlement Guarantee Fund.

### **I. Core Settlement Guarantee Fund**

NSE Clearing shall have a fund called Core SGF for each clearing segment to guarantee the settlement of trades executed in respective segment.

In the event of a clearing member (member) failing to honour settlement commitments, the Core SGF shall be used to fulfill the obligations of that member and complete the settlement without affecting the normal settlement process.

### **II. Corpus of Core SGF**

NSE Clearing shall maintain core SGF based solely on the methodology prescribed by SEBI for determining the minimum required corpus of Core SGF for cash market, futures and options, currency derivatives segments and commodity derivatives segment. For debt segment and tri-party repo, the minimum required corpus shall be determined in accordance with the criteria approved by NSE Clearing Board. In addition to SEBI specified stress test scenarios, NSE Clearing may consider additional scenarios for determination of Minimum Required Corpus. **(Refer Appendix to the Policy for details on stress testing)**

#### **A. Cash Segment**

NSE Clearing shall calculate the total credit exposure due to simultaneous default causing highest credit exposure by;

1. At least two clearing members and their associates
2. 1 Custodian

### **B. Futures and Options segment**

For applicability of a cover-n standard based upon provisions of above-mentioned SEBI Circular; NCL is currently categorized to fall under Category A i.e. A CC having equal to or more than 40% of the share of clearing volumes in equity derivatives segment. This exercise to determine the Category shall be performed for every subsequent Financial Year.

As a Category A CC, NCL's minimum corpus for Core SGF shall be

1. By considering the total credit exposure due to simultaneous default of three clearing members (and associates) causing highest credit exposure as per Stress Test Methodology mentioned, OR
2. INR 10,500 crores, whichever is higher

### **C. Currency Derivatives segment**

NSE Clearing shall calculate Minimum Required Corpus by considering the total credit exposure due to simultaneous default of at least two clearing members (CM) and their associates causing highest credit exposure under extreme but plausible worst case loss scenarios.

### **D. Commodity Derivatives segment**

NSE Clearing shall calculate Minimum Required Corpus by considering the total credit exposure due to;

1. Simultaneous default of at least two clearing members (and their associates) causing highest credit exposure or
2. 50% of the credit exposure due to simultaneous default of all clearing members

The Minimum Required Corpus computed above shall be subject to minimum threshold value of Rs 10 crores as specified by SEBI its circular no. SEBI/HO/CDMRD/DRMP/CIR/P/2018/111 dated July 11, 2018.

### **E. Debt segment**

NSE Clearing shall arrive at the required corpus of core SGF based on the following criteria where Minimum Required Corpus for Core SGF of Debt Segment shall be the higher of:

1. Aggregate of losses of top 2 members assuming close out of obligations at loss of 4% less required margins
2. Rs. 4 crores

### **F. Tri-party repo**

NSE Clearing shall arrive at the required corpus of core SGF based on stress test loss for a given day as follows;

1. The total uncovered loss for each clearing member will be considered as sum of uncovered loss for lending obligations and uncovered loss for borrowing obligations
2. The sum of total uncovered loss of top two members in terms of highest total uncovered loss will be considered as stress test loss for a given day.

The Core SGF has been set up initially with a Minimum Required Corpus of Rs. 17 Crores.

### **G. Securities Lending and Borrowing Scheme**

In the Securities Lending and Borrowing Scheme, NSE Clearing is acting as an approved intermediary in accordance with SEBI circular no. MRD/DoP/SE/Dep/Cir- 14 /2007 dated December 20, 2007.

Securities Lending and Borrowing Scheme is not a segment of NSE or NSE Clearing. As per the SEBI circular, Core SGF is to be constituted for each segment of each Recognised Stock Exchange (SE) to guarantee the settlement of trades executed in respective segment of the SE.

Since Securities Lending and Borrowing is not a segment, Core SGF shall not be constituted for Securities Lending and Borrowing Scheme.

## **III. Minimum Required Corpus**

NSE Clearing shall compute the Minimum Required Corpus (MRC) for cash market, futures and options, currency derivatives, commodity derivatives and debt segment which shall be subject to the following;

1. The MRC shall be fixed for a month.
2. By 15th of every month, NSE Clearing shall review and determine the MRC for next month based on the results of daily stress tests of the preceding month. NSE Clearing shall also review and determine by 15th of every month, the adequacy of contributions made by various contributors and any further contributions to the Core SGF required to be made by various contributors for the next month.
3. For Futures & Options segment, additional contributions to MRC can be made by the contributors in a staggered manner in case the requirement is more than 10% of the core SGF.
4. For every day of the preceding month, uncovered loss numbers shall be estimated by the various stress tests for credit risk conducted by the NSE Clearing for the segment and highest of such numbers shall be taken as worst case loss number for the day.
5. Average of all the daily worst case loss numbers determined in (3) shall be calculated.
6. The MRC for next month shall be higher of the average arrived in at step (4) and the segment MRC as per previous review.
7. For the Futures and Options segment, to determine the additional contribution the penalties credited to the Core SGF and the interest accrued on such penalties (including one time penalties transferred from SGF of cash market segment), as on October 31, 2024, shall also be taken into account
8. Daily stress tests:
  - a. For Cash Market segment and Currency derivative segment, the daily stress tests shall be conducted in the manner specified by SEBI vide its circular no. CIR/MRD/DRMNP/25/2014 dated August 27, 2014. For Futures and Options segment the daily stress tests shall

be conducted in the manner specified by SEBI vide its circular no. SEBI/HO/MRD/MRD-PoD-2/P/CIR/2024/131 dated October 01, 2024

- b. For Commodity Derivatives segment, the daily stress tests shall be conducted in the manner specified by SEBI vide its circular no. SEBI/HO/CDMRD/DRMP/CIR/P/2018/111 dated July 11, 2018.
- c. For debt segment and tri-party repo, the daily stress tests shall be conducted as per the criteria approved by NSE Clearing Board.

## **V. Contribution to Core SGF**

### **A. Cash Market Segment, Futures & Options Segment, Currency Derivatives Segment and Commodity Derivatives segment**

1. NSE Clearing contribution to core SGF will be minimum 50% of MRC of each segment. NSE Clearing shall make this contribution from its own funds. NSE Clearing contribution to core SGFs will be considered as part of its net worth.
2. Stock Exchanges contribution to core SGF will be minimum 25% of MRC.
3. For contributions as per Point 1 and 2 above, any incremental requirement of Minimum Required Corpus from NSE Clearing and Stock Exchanges shall be adjusted against the interest accrued on cash contribution of CC and Exchanges respectively (interest accrued as mentioned in Point VI) before calling for additional contribution from them.
4. The total contribution from members to core SGF for each segment will not be more than 25% of MRC of the respective segment.
  - a. The clearing member contribution shall consist of Minimum contribution and Dynamic contribution.
  - b. A Minimum contribution will be required to be maintained by all clearing members at all times. Members will be required to bring in minimum contribution since all members have inherent risk potential and should all participate in loss mutualisation.
  - c. The dynamic contributions of individual CMs shall be assessed pro-rata based on the risk they bring to the system.
    - i. Dynamic contribution for members will be arrived at in the monthly review.

- ii. The members shall be informed about their primary contribution (minimum and dynamic) along with their capped additional contribution (assessed for Layer 7 of default waterfall) by the 15th of each month.
  - iii. The members shall be required to bring in dynamic contribution before the start of the month.
  - iv. In case there is failure on part of clearing members to bring in their requisite contribution to Core SGF for any month by the start of the month, the trading facility of trading members and /or clearing facility of custodial participants clearing through such members/custodians shall be withdrawn, until such members replenish their contribution.
  - v. Further penalty as applicable for margin shortfall may be levied to the clearing members.
- d. NSE Clearing may collect Clearing Member (CM) primary contribution either upfront or staggered over a period of time.
  - e. NSE Clearing shall accept clearing member primary contribution in the form of cash, fixed deposits and central government securities which shall be adjusted from their margin deposit or security deposits, either fully or partly, subject to availability. In case no such deposits are available, fresh deposits would be required to be deposited. No exposure shall be available to CMs on their contribution to core SGF.
  - f. NSE Clearing shall release the member's contribution to Core SGF in cases where the current contribution of the member with NSE Clearing is in excess of required contribution assessed at the time of review and determination of MRC. The release of excess contribution shall be made after completion of review but before start of the month for which the MRC review is applicable.
  - g. In case of staggered contribution as mentioned in Point (d) above, the remaining balance shall be met by NSE Clearing to ensure adequacy of total Core SGF corpus at all times. Such contribution shall be available to NSE Clearing for withdrawal as and when further contributions from CMs are received.
  - h. Currently as per SEBI circular reference no SEBI/HO/MRD/DRM/NP/CIR/P/2016/54 dated May 04, 2016 clearing member contribution has been contributed by NSE/NSE Clearing in Cash Market Segment, Futures & Options Segment and Currency Derivatives Segment.
  - i. In commodity derivatives segment, the clearing member contribution shall be met by NSE.

## **B. Debt Segment**

The contribution to core SGF for Debt Segment from various contributors shall be as follows;

1. NSE Clearing contribution to core SGF shall be 75% of MRC.
2. NSE contribution to core SGF shall be 25% of MRC.
3. For contributions as per Point 1 and 2 above, any incremental requirement of Minimum Required Corpus from NSE Clearing and NSE shall be adjusted against the interest accrued on cash contribution of CC and Exchanges respectively (interest accrued as mentioned in Point VI) before calling for additional contribution from them.
4. NSE Clearing shall not seek contribution from its clearing members in Debt Segment.

## **C. Tri-party repo**

The contribution to core SGF for Tri-party from various contributors shall be as follows;

1. Clearing Members to contribute 50% of the MRC at a minimum
2. Clearing Member total contribution not to exceed 75% of the MRC
3. The average open positions for each member (lend plus borrow) for the review month shall be considered. The total clearing member contribution shall be allocated pro-rata to all clearing members based on their average open position during the review month.
4. The remaining amount to be contributed by the Clearing Corporation and the Exchange in equal proportion.
5. The initial contribution shall be made by NSE Clearing and NSE only in equal proportion.

## **VI. Penalties levied by NSE Clearing**

Any penalties levied by NSE Clearing (as per Regulation 32 of SECC Regulations, 2018) shall be credited to Core SGF corpus.

## **VII. Interest on Core SGF cash contribution**

Interest on cash contribution to Core SGF shall also accrue to the Core SGF and pro-rata attributed to the contributors in proportion to their cash contribution.

## **Appendix: Stress testing**

### **A. Cash Market**

#### **a) Stress test scenarios**

NSE Clearing shall conduct daily stress tests in Cash Market Segment to arrive at the uncovered losses at member / Custodian level under the following scenarios;

##### **I. SEBI specified scenarios:**

- i. Default by at least two clearing members and their associate members
- ii. Default by 1 Custodian

##### **II. Additional stress scenarios:**

- i. Defaults by top two clearing members and their associate custodian(s)
- ii. Default by top custodian and its associate clearing member(s)

#### **b) Loss estimation**

- i. The stress tests shall be conducted on S day (Day of Stress Test) and uncovered losses will be arrived at for the above scenarios. For each scenario, the uncovered losses for a member / custodian will be computed for trades executed on S-2 day, S-1 day and S day till pay-in deadline.
- ii. It shall be assumed that each clearing member (CM) / custodian would default in meeting its 'cumulative funds pay-in' and 'cumulative securities pay-in' obligations.
- iii. Any early pay-in of funds/securities shall be ignored.
- iv. Cumulative pay-in/pay-out of each clearing member's trades shall include non-institutional trades and 2X% of institutional trades undertaken on S-2 day, S-1 day and S day till pay-in deadline that has not yet been confirmed
- v. X% shall be the highest daily % by value of custodial rejections in the previous 12 months.
- vi. Securities Pay-in failure: It shall be assumed that the failure to bring in securities would result in financial close out and NSE Clearing would suffer a loss of minimum 20% of the value of such transaction.

- vii. Funds Pay-in failure: The assumed loss on liquidation that would be paid out by the defaulting member/custodian shall be;
  - Group 1 securities: 20%
  - Group 2 and 3 securities: 20% scaled up by root of 3
- viii. Gross loss due to the member/custodian = (Funds pay-in) + (120% of securities pay-in) – (liquidation value of securities pay out)
- ix. The credit exposure of NSE Clearing towards each member/custodian shall be determined by assessing the gross loss of the member/custodian against the defaulting member/custodians required margins (i.e. assuming early pay-in if any has not been made) and mandatory deposits (equity scrips as collateral valued with minimum 20% haircut). Excess collateral if any shall be ignored.
- x. Total credit exposure to NSE Clearing due to default of member/custodian shall be determined for each of the stress test scenarios mentioned above.

## B. Futures & Options segment

### a) Stress test scenarios

NSE Clearing shall conduct daily stress tests in Futures & Options Segment to arrive at the uncovered losses at clearing member level under the following scenarios;

#### I. SEBI specified hypothetical scenarios:

The price movement in respect of each underlying to the extent of 1.5 times the normal price scan range (PSR) and 1.5 times the normal volatility scan range shall be considered.

<u>Scenario</u>	<u>Direction</u>	<u>Movement</u>
1a	Up	$PSR + 1.5^1 \times \text{sigma} (\lambda=0.995) \times \sqrt{2}$
1b	Up	$PSR + 1.5^1 \times \text{sigma} (\lambda=0.94) \times \sqrt{2}$
2a	Down	$-PSR - 1.5^1 \times \text{sigma} (\lambda=0.995) \times \sqrt{2}$
2b	Down	$-PSR - 1.5^1 \times \text{sigma} (\lambda=0.94) \times \sqrt{2}$

1. Multiple of 1.5 for Indices and 1.75 for stocks

## **II. SEBI specified historical scenarios:**

The price movement in respect of each underlying over the last 10 years will be considered on a rolling basis. The maximum percentage price movement shall be applied to the price on the day for which the stress test is being done:

- i. Maximum percentage rise over a period of 1 day
- ii. Maximum percentage fall over a period of 1 day

### **iii. SEBI defined additional Scenarios:**

SEBI vide circular: SEBI/HO/MRD/MRD-PoD-2/P/CIR/2024/131 dated October 01, 2024, has introduced the following additional hypothetical stress testing methodologies:

1. Stressed VaR – Uses a variance-covariance matrix of stocks and Indices based on their underlying 3-day non-overlapping log returns for an appropriate stress period assuming volatility to be scaled by a factor of 2 and then determining returns using Montecarlo Simulations (50000 simulations) with multivariate normality.

A proxy loss computation shall be undertaken to retrieve 10 out of the 50000 simulation scenarios. The proxy loss shall be based on delta equivalent open interest model wherein one side delta open interest of the entire market for a stock/index shall be multiplied by the 50000 simulated returns to arrive at stock/index proxy loss. For every simulation, all the stocks/indices proxy losses shall be added up to arrive at Market Level Proxy Loss. Out of the 50000 proxy losses, the 10 simulations corresponding to 99.8<sup>th</sup> percentile loss are considered for full revaluation as below.

Based on the above 10 simulated returns and current volatility shocked by 100%, the full revaluation of instruments shall be undertaken. The stress period currently applicable shall be 1<sup>st</sup> April 2019 to 31<sup>st</sup> March 2020.

2. Filtered Historic Simulation – For an appropriate historical stress period returns, EWMA volatility is determined with  $\lambda = 0.94$  over 3-day non-overlapping log returns. These Historical returns are divided by the contemporaneous EWMA volatility to arrive at a set of Scaled EWMA Ratio which are then multiplied by latest estimate of Volatility to arrive at a set of approximately 80 (assuming one year stress period with 3-day non overlapping dates) returns for each stock and Indices.

A proxy loss computation shall be undertaken to retrieve the top 10 scenarios based on delta equivalent open interest model. The proxy loss shall be one side delta open interest of the entire market for a stock/index multiplied by the 80 simulated returns to arrive at stock/index proxy loss. For every simulation, all the stocks/indices proxy losses shall be added up to arrive at Market Level Proxy Loss. Out of the 80 proxy losses, the top 10 simulations loss are considered for full revaluation as below.

Based on the above 10 set of return and present-day volatility scaled by a factor of 2, the revaluation of instruments in a portfolio shall be undertaken. The historical stress period returns currently applicable shall be 1<sup>st</sup> April 2019 to 31<sup>st</sup> March 2020.

3. Factor Model – Highest 3-day Rise % and Fall % of NIFTY since 1<sup>st</sup> January 2000 is multiplied by Beta ( $\beta$ ) of the stocks or Indices with respect to NIFTY from an appropriate historical stress period (The historical stress period returns currently applicable shall be 1<sup>st</sup> April 2019 to 31<sup>st</sup> March 2020.) to arrive at the return for Stocks and Indices under both the scenarios. Volatility shall be shocked by 100% for full revaluation of instruments.

In the above 3 scenarios, it may be possible that for some stocks/Indices data may not be available in the historical stress period due to it being a new listing or closing price data not being completely available during the period. For such stocks/Sectoral Indices – “Average Industry Beta” from the stress period shall be used as a proxy and the simulated returns for such stocks shall be arrived at by multiplying NIFTY return with average industry beta to arrive at proxy stock/Sectoral Indices return. In case of a broad-based Index, the returns of NIFTY shall be considered as Proxy change in price.

#### **b) Loss estimation**

Simultaneous default of at least top 3 clearing members (and their associates) causing highest credit exposure shall be considered and arrived as follows:

1. Time of stress test is at the time of pay-in deadline
2. Loss shall be calculated at client/Custodial Participants/TM and CM proprietary portfolio level
3. Loss shall be computed for each contract in the portfolio
4. All open positions assumed to be squared up at the theoretical price corresponding to the revised prices of underlying in each of the 7 scenarios

5. Losses/Profits at the contract level aggregated to client/Custodial Participants/TM and CM proprietary portfolio level
6. For each client/Custodial Participant.
  - Gross loss = Loss as per (5) above – Margins (excluding COBG)
  - Profits shall be ignored.
7. For proprietary level.
  - Gross loss = Loss as per (5) above
  - Profits shall be ignored.
8. Gross loss at TM level = Aggregate of losses of all clients/TM proprietary portfolios
9. Uncovered loss at TM level = Gross loss as per (8) above – TM Proprietary Margins (excluding COBG)
10. Gross loss at CM level = Aggregate of losses of all Custodial Participants/CM proprietary portfolios/Uncovered loss at TM level as per (9) above
11. Uncovered loss at CM level = Gross loss as per (10) above – CM Proprietary Margins (excluding COBG) – Mandatory Deposits (*where equity scrips as collateral valued with minimum 20% haircut*).
12. Excess collateral if any shall be ignored.

### C. Currency Derivatives segment

#### a) Stress test scenarios

NSE Clearing shall conduct daily stress tests in Currency Derivatives Segment to arrive at the uncovered losses at clearing member level under the following scenarios.

#### I. SEBI specified hypothetical scenarios

The price movement in respect of each underlying to the extent of 1.75 times the normal price scan range (PSR) and 1.5 times the normal volatility scan range shall be considered.

<u>Scenario</u>	<u>Direction</u>	<u>Movement</u>
<u>1a</u>	<u>Up</u>	<u>PSR + 1.75 x sigma (<math>\lambda=0.995</math>)</u>
<u>1b</u>	<u>Up</u>	<u>PSR + 1.75 x sigma (<math>\lambda=0.94</math>)</u>
<u>2a</u>	<u>Down</u>	<u>-PSR - 1.75 x sigma (<math>\lambda=0.995</math>)</u>
<u>2b</u>	<u>Down</u>	<u>-PSR - 1.75 x sigma (<math>\lambda=0.94</math>)</u>

## II. SEBI specified historical scenarios

The price movement in respect of each underlying over the last 10 years will be considered on a rolling basis. The maximum percentage price movement shall be applied to the price on the day for which the stress test is being done:

- i. Maximum percentage rise over a period of 1 day
- ii. Maximum percentage fall over a period of 1 day

## III. Additional stress scenarios

- i. 4% fall in underlying prices of all currency pairs
- ii. 4% rise in underlying prices of all currency pairs
- iii. 2% fall in underlying prices of all interest rate futures
- iv. 2% rise in underlying prices of all interest rate futures

### b) Loss estimation

Loss Estimation for SEBI specified scenarios - Simultaneous default of at least top 2 clearing members (*and their associates*) causing highest credit exposure shall be considered and arrived as follows:

- a. Loss shall be calculated at client/Custodial Participants/TM and CM proprietary portfolio level
- b. Loss shall be computed for each contract in the portfolio
- c. All open positions assumed to be squared up at the theoretical price corresponding to the revised prices of underlying in each of the 10 scenarios
- d. Losses/Profits at the contract level aggregated to client/Custodial Participants/TM and CM proprietary portfolio level
- e. For each client/Custodial Participant.
  - i. Gross loss = Loss as per (d) above – Margins (excluding COBG)
  - ii. Profits shall be ignored.
- f. For proprietary level.
  - i. Gross loss = Loss as per (d) above
  - ii. Profits shall be ignored.
- g. Gross loss at TM level = Aggregate of losses of all clients/TM proprietary portfolios
- h. Uncovered loss at TM level = Gross loss as per (g) above – TM Proprietary Margins (excluding COBG)
- i. Gross loss at CM level = Aggregate of losses of all Custodial Participants/CM proprietary portfolios/Uncovered loss at TM level as per (h) above
- j. Uncovered loss at CM level = Gross loss as per (i) above – CM Proprietary Margins (excluding COBG) – Mandatory Deposits

(where equity scrips as collateral valued with minimum 20% haircut).

- k. Excess collateral if any shall be ignored.

## **D. Debt Segment**

### **a) Stress test scenarios**

NSE Clearing shall conduct daily stress tests in Debt Segment to arrive at the uncovered losses at clearing member level by assuming default of top two clearing members.

### **b) Loss estimation**

- i. It shall be assumed that each clearing member (CM) would default in meeting its 'cumulative funds pay-in' and 'cumulative securities pay-in' obligations
- ii. It shall be assumed that obligations shall be closed out at loss of 4%
- iii. Gross loss due to the member/custodian = (Funds pay-in) + Loss due to financial close out – liquidation value
- iv. The credit exposure of NSE Clearing towards each member/custodian shall be determined by assessing the gross loss of the member/custodian against the defaulting member/custodians required margins (i.e. assuming early pay-in if any has not been made) and mandatory deposits (equity scrips as collateral valued with minimum 20% haircut). Excess collateral if any shall be ignored.
- v. Total credit exposure to NSE Clearing due to default of member shall be considered for the stress test scenario mentioned above.

## **E. Tri-party repo**

### **a) Stress test scenarios**

NSE Clearing shall conduct daily stress tests for Tri-party repo to arrive at the uncovered losses at clearing member level under the following scenarios;

## **I. Scenario for lend obligation**

- i. Clearing members shall be assumed to default on their lend obligations.
- ii. The funding cost of Clearing Corporation will be considered as 80% (annualized).
- iii. The funding cost of each of the lend position will be calculated as the interest applicable for the period of lending.
- iv. The funding cost in excess of the lend margin of each clearing member will be noted. This will be termed as the uncovered loss for lend obligations.

## **II. Scenario for borrow obligation**

- i. Clearing members shall be assumed to default on their borrow obligations.
- ii. The gross value of collateral of the clearing member will be considered.
- iii. The collateral shall be assumed to be liquidated at 25% below the value of the collateral. This valuation will be termed as stressed valuation of collateral.
- iv. The forward leg borrow obligation in excess of the stressed value of collateral will be noted. This will be termed as uncovered loss for borrow obligations.

### **b) Loss estimation**

The stress test loss shall be estimated as under:

- i. The total uncovered loss for each clearing member will be considered as sum of uncovered loss for lending obligations and uncovered loss for borrowing obligations
- ii. The sum of total uncovered loss of top two members in terms of highest total uncovered loss will be considered as stress test loss for a given day.

## **F. Commodity Derivatives segment**

### **a) Stress test scenarios**

NSE Clearing shall conduct daily stress tests in Commodity Derivatives Segment to arrive at the uncovered losses at clearing member level under the following scenarios;

## **I. Historical Scenarios:**

1. Peak Historical Return:  
Scenario 1A: Maximum % rise over MPOR period in last 15 years  
Scenario 1B: Maximum % fall over MPOR period in last 15 years
2. Peak Historical Volatility:  
Scenario 2A: Minimum of 3.5 times the peak historical volatility in last 15 years or 110% of scenario 1 for price fall  
Scenario 2B: Minimum of 3.5 times the peak historical volatility in last 15 years or 110% of scenario 1 for price rise
3. Augmented historical:  
Top 10 days during previous 15 years based on absolute average price movement across all underlying. All the price movements scaled up by 10% (10 Scenarios)

## **II. Hypothetical Scenario:**

4. Stress MPOR:  
Scenario 4A: 3.5 times of current day volatility scaled up by square root of 5 for price rise  
Scenario 4B: 3.5 times of current day volatility scaled up by square root of 5 for price fall
5. Stressed PSR & VSR  
Scenario 5A: Underlying price increasing by 1.5 PSR, volatility increasing by 1.5 VSR  
Scenario 5B: Underlying price decreasing by 1.5 PSR, volatility increasing by 1.5 VSR

Stress tests are conducted using each of the scenario given above:

- i. By stressing positions in all commodities simultaneously
- ii. By first identifying top 10 commodities based on open interest and stressing 1 commodity at a time.

### **b) Loss estimation**

For each of the scenarios, Clearing Corporation calculates the total credit exposure due to simultaneous default of at least 3 clearing members (and their associates) causing highest credit exposure.

All open positions are assumed to be squared up at the theoretical price corresponding to the revised prices of the underlying in each of the above

scenarios the net profit/loss in squaring off the portfolio is to be calculated under each of the above scenarios.

For each clearing member, the credit exposure to CC calculated as follows:

- i. Time of stress test is End of day.
- ii. Losses calculated at client portfolio level.
- iii. For each client, residual loss shall be equal to → (loss due to close-out of client positions – margin supporting client positions)
- iv. All residual losses (residual profits to be ignored) for all clients shall be grossed to compute total residual losses due to client positions.
- v. Loss due to close-out of proprietary positions shall be considered.
- vi. Loss at (iv) and loss at (v) and the net pay-in/pay-out requirement of the clearing member (pay-in and pay-out pertaining to requirements of both S-1 and S (till pay-in time) day to be reckoned) shall be assessed against required margins (excluding margin supporting client positions and excess collateral, if any) and other mandatory deposits of defaulting member to calculate credit exposure of CC to the member. Equity scrips as collateral, if any, shall be valued with minimum 20% haircut