

Date: 25th Feb. 2006

Securities Segment

Note on Methodology for Imposition of Volatility Margin

1. Background

1.1 CCIL settles trades in the Securities Settlement Segment for its members. Margins are collected by CCIL from such members to take care of the consequences of any possible default. The risk arising out of guaranteeing of trades, in case of unusual volatility in the market, is required to be covered through imposition of Volatility Margin. In the context of this requirement, it has been felt that there should be an objective and rational approach towards imposition of Volatility Margin, its withdrawal and of the scale of such margin to be imposed etc.

2. Risk to the System from Volatility:

2.1 The risk to the system on account of volatility can come from the impact of price fluctuations on:

- (i) trades carried over from the previous day, and
- (ii) trades taken up for guaranteed settlement during the day

2.2 Trades carried over from the previous day are effectively at previous day's MTM price due to imposition of MTM margin at the end of the previous day. Hence, unusual movement of traded prices from the respective MTM Prices creates risk.

2.3 Moreover, unusual intra day fluctuation in the price of a security can also cause significant risk to the system (as securities can be bought or sold at the highest or lowest price respectively thus causing significant risk to the system).

3. Proposed Approach:

In the backdrop, CCIL has carried out analysis of the trade data and prices for the year 2005. Based on the analysis, it has been felt that the approach to decide on imposition of volatility margin, its extent and level for its withdrawal may be set as under:

- a) CCIL may identify 3 most liquid securities based on the analysis of trades of the month. These securities may be included in Basket of securities to be considered for tracking market volatility. This process may be undertaken before 7th day of the next month and the members may be kept advised of the securities selected for this purpose.
- b) The under-noted Estimators of Volatility may be used:
- *Intra-day price fluctuation* as a difference between *High and Low Price of the selected securities* in the basket [Estimator – I]
 - Price fluctuation based on the *higher of the difference between*
 - i) MTM Price of the previous day and low price of the current day, and
 - ii) MTM Price of the previous day and high price of the current day[Estimator – II]
- c) Analysis of volatility by way of computation of the value of the Estimators may be undertaken based on the data received at the end of each batch. In due course, the analysis may be made on-line.
- d) If a security included in the Basket of Securities is not traded on a day, the security may not be considered for computation of the Estimators for such day and the following day (as at least previous day's MTM Price derived from the trades of the day is required for accurate computation of the Estimator).
- e) Value of the Estimators for each selected security may be compared with the Trigger value. To start with, the Trigger Value may be set at 80% of the 1-day VaR of the respective securities in the basket. If the value of the estimator reaches 80% of 1 day VaR for the respective security, Volatility Margin of 25% (i.e. increase in margin factor by 25%) may be imposed. Thereafter, for each increase in the value of the Estimator of equivalent of 40% of 1 day VaR for the respective security, an increase of 25% in Volatility Margin may be effected.

- f) If the value of any of the Estimator for a security is higher than the Trigger value for the security, such position be considered as a trigger for imposing Volatility Margin with reference to the said security. If there are 3 securities in the Basket, Estimators for at least 2 securities may need to indicate volatility by reaching the trigger value. For less than 3 securities in the basket, if the values of Estimator for any of the securities indicate presence of volatility, Volatility Margin may be imposed. The highest value of the Estimator for any of the securities in the basket may be taken as reference for deciding on the scale of the margin to be imposed (e.g. if the values of the Estimators 1 & 2 for Security 1 are 85% & 120% respectively and the values of the same estimators for Security 2 are 65% & 82% respectively, volatility margin of 50% can be imposed based on the value of the Estimator 2 for Security 1).
- g) In case of an Auction/Re-issuance of a security during the month, such security may be considered for inclusion in the Basket based on an observation of the concentration of trades in it for the 3 day period starting from the 3rd business day from such date of auction or re-issuance. If its trade volume for the 3rd to 5th days is such that it forms a part of the top 3 traded securities for all those days, it may be considered for inclusion in the Basket of securities by excluding the existing security in the 3rd position in terms of turnover in the previous month.
- h) The Volatility Margin may be withdrawn at the time of End of the Day Risk valuation of a day if the values of the Estimators are at less than the **60%** of the 1-day VaR for two consecutive days for the securities which had earlier indicated increased volatility and caused imposition of volatility margin.

4. Simulated Result Based on the Proposed Approach;

If the approach proposed in Para 3 above was followed in 2005, CCIL would have imposed Volatility Margin on the under-noted 8 days. The details are as under:

Sl. No	Date Of Imposition	Estimators beyond the trigger level	Extent of Volatility Margin (as % of Initial Margin)	Security prices in which volatility indicated	No. of Securities in the basket	Date of Withdrawal
1	1-Jan-05	Estimator - 1 (107.66%)	25%	7.38% GS 2015	2	03-Jan-05 EOD
2	3-Jan-05	Estimator - 1 (83.14%) Estimator - 2 (83.55%)	25%	7.38% GS 2015	2	05-Jan-05 EOD
3	7-Feb-05	Estimator - 1 (90.02%) Estimator - 2 (87.03%)	25%	7.38% GS 2015	2	09-Feb-05 EOD
4	20-Apr-05	Estimator - 2 (93.56%)	25%	8.07% GS 2017	2	22-Apr-05 EOD
5	28-Apr-05	Estimator - 1 (108.59%) Estimator - 2 (125.15%)	50%	8.07% GS 2017	2	30-Apr-05 EOD
		Estimator - 1 (154.97%) Estimator - 2 (105.22%)		6.85% GS 2012	2	
6	4-May-05	Estimator - 1 (87.30%)	25%	7.55% GS 2010	2	06-May-05 EOD
7	24-May-05	Estimator - 1 (115.64%) Estimator - 2 (112.11%)	25%	8.07% GS 2017	2	26-May-05 EOD
8	26-Jul-05	Estimator - 1 (178.01%) Estimator - 2 (169.64%)	100%	10.25% GS 2021	3	28-Jul-05 EOD
		Estimator - 1 (131.64%) Estimator - 2 (122.17%)		7.55% GS 2010	3	
		Estimator - 1 (93.01%) Estimator - 2 (89.53%)		6.85% GS 2012	3	

5. The methodology proposed is simple, transparent and easy to track and fits neatly into the existing margining system of CCIL.
6. Members are requested to forward their comments on the proposed approach by 15th March '06 for CCIL to take a decision in this respect. Feedbacks may please be directed to rmd@ccilindia.co.in. In case, any further clarification is required, the same may be had from Mr. V Swamynathan, Manager (Risk Management) at 56639327 or Mr. Siddhartha Roy, Sr. Vice President (Risk Management) at 56630321.

***** *****

Annexure I

Analysis of trade data for identification of volatility estimators (Period covered January '05 To December '05)
--

	Security	% Val	Max. of (Prev. Day's MTM - Day's Hi) & (Prev. Day's MTM - Day's Lo)	Log of MTM Current Day To Previous day	Log of WAP Current Day To Previous day	Log of Day High To day Low	Log of Day High To Previous Day Low	Log of Day Low To Previous day High
Jan-2005	7.38%	80	1	0	0	2	1	2
		75	1	0	0	2	4	2
		70	1	0	0	2	4	2
		65	1	1	0	2	4	2
		60	1	1	0	2	4	3
	7.55%	80	0	0	0	0	1	2
		75	0	0	0	0	1	2
		70	1	0	0	2	1	2
		65	1	0	1	2	1	3
		60	1	0	1	3	2	3

	Security	% Val	Max. of (Prev. Day's MTM - Day's Hi) & (Prev. Day's MTM - Day's Lo)	Log of MTM Current Day To Previous day	Log of WAP Current Day To Previous day	Log of Day High To day Low	Log of Day High To Previous Day Low	Log of Day Low To Previous day High
Feb-2005	7.38%	80	1	0	0	1	0	2
		75	1	1	0	1	0	2
		70	1	1	0	1	0	2
		65	1	1	0	1	0	2
		60	1	1	0	2	0	2
	7.55%	80	0	0	0	0	0	0
		75	0	0	0	0	0	0
		70	0	0	0	0	0	0
		65	0	0	0	0	0	1
		60	0	0	0	0	1	0

	Security	% Val	Max. of (Prev. Day's MTM - Day's Hi) & (Prev. Day's MTM - Day's Lo)	Log of MTM Current Day To Previous day	Log of WAP Current Day To Previous day	Log of Day High To day Low	Log of Day High To Previous Day Low	Log of Day Low To Previous day High	
Mar- 2005	7.38%	80	0	0	0	0	0	0	
		75	0	0	0	0	0	0	
		70	0	0	0	0	0	0	
		65	0	0	0	0	0	0	
		60	0	0	0	0	0	0	
	7.55%	80	0	0	0	0	0	0	0
		75	0	0	0	0	0	0	0
		70	0	0	0	0	0	0	0
		65	0	0	0	0	0	0	1
		60	0	0	0	0	0	0	1

	Security	% Val	Max. of (Prev. Day's MTM - Day's Hi) & (Prev. Day's MTM - Day's Lo)	Log of MTM Current Day To Previous day	Log of WAP Current Day To Previous day	Log of Day High To day Low	Log of Day High To Previous Day Low	Log of Day Low To Previous day High
Aprl- 2005	8.07%	80	2	0	0	1	8	6
		75	2	0	0	2	8	6
		70	2	0	0	2	8	6
		65	2	1	1	3	8	7
		60	2	1	1	4	8	7
	6.85%	80	1	0	0	1	4	0
		75	1	0	0	2	5	0
		70	1	0	0	2	6	1
		65	2	0	0	2	6	1
		60	3	0	0	2	6	2

	Security	% Val	Max. of (Prev. Day's MTM - Day's Hi) & (Prev. Day's MTM - Day's Lo)	Log of MTM Current Day To Previous day	Log of WAP Current Day To Previous day	Log of Day High To day Low	Log of Day High To Previous Day Low	Log of Day Low To Previous day High
May-2005	8.07%	80	1	1	0	1	1	3
		75	1	1	0	1	1	3
		70	1	1	0	2	1	5
		65	2	1	0	2	1	6
		60	3	1	0	4	1	7
	7.55%	80	0	0	0	1	0	2
		75	0	0	0	1	1	2
		70	0	0	0	1	1	2
		65	0	0	0	1	1	2
		60	0	0	0	2	1	3

	Security	% Val	Max. of (Prev. Day's MTM - Day's Hi) & (Prev. Day's MTM - Day's Lo)	Log of MTM Current Day To Previous day	Log of WAP Current Day To Previous day	Log of Day High To day Low	Log of Day High To Previous Day Low	Log of Day Low To Previous day High	
June-2005	6.85%	80	0	0	0	0	1	0	
		75	0	0	0	0	1	1	
		70	0	0	0	0	1	2	
		65	0	0	0	0	1	2	
		60	0	0	0	0	2	3	
	7.37%	80	0	0	0	0	0	0	1
		75	0	0	0	0	0	0	1
		70	0	0	0	0	0	0	1
		65	0	0	0	0	0	1	1
		60	0	0	0	0	0	2	3

	Security	% Val	Max. of (Prev. Day's MTM - Day's Hi) & (Prev. Day's MTM - Day's Lo)	Log of MTM Current Day To Previous day	Log of WAP Current Day To Previous day	Log of Day High To day Low	Log of Day High To Previous Day Low	Log of Day Low To Previous day High
July-2005	10.25%	80	1	1	1	2	2	3
		75	1	1	1	3	2	3
		70	1	1	2	3	3	3
		65	2	1	3	4	5	3
		60	2	1	3	4	7	5
	7.55%	80	2	1	0	1	1	2
		75	2	1	0	1	1	2
		70	2	1	1	1	1	2
		65	2	1	2	1	1	2
		60	2	1	2	1	1	2
	6.85%	80	1	0	0	1	0	2
		75	1	0	0	1	1	2
		70	1	1	0	1	1	2
		65	1	1	0	1	1	2
		60	1	1	1	1	2	2

	Security	% Val	Max. of (Prev. Day's MTM - Day's Hi) & (Prev. Day's MTM - Day's Lo)	Log of MTM Current Day To Previous day	Log of WAP Current Day To Previous day	Log of Day High To day Low	Log of Day High To Previous Day Low	Log of Day Low To Previous day High
Aug-2005	10.25%	80	0	0	0	0	0	1
		75	0	0	0	0	0	1
		70	0	0	0	0	1	2
		65	0	0	0	2	1	2
		60	0	0	0	3	1	2
	7.55%	80	1	0	0	1	0	1
		75	1	0	0	1	0	1
		70	1	0	0	1	0	1
		65	1	0	0	1	0	1
		60	1	0	0	1	0	1
	6.85%	80	0	0	0	1	1	0
		75	0	0	0	1	1	0
		70	0	0	0	1	1	0
		65	0	0	0	1	1	0
		60	0	0	0	1	1	0

	Security	% Val	Max. of (Prev. Day's MTM - Day's Hi) & (Prev. Day's MTM - Day's Lo)	Log of MTM Current Day To Previous day	Log of WAP Current Day To Previous day	Log of Day High To day Low	Log of Day High To Previous Day Low	Log of Day Low To Previous day High	
Sept - 2005	7.37%	80	0	0	0	0	0	0	
		75	0	0	0	0	0	0	
		70	0	0	0	0	0	0	
		65	0	0	0	0	0	0	
		60	0	0	0	0	0	0	
	10.25%	80	0	0	0	0	0	0	0
		75	0	0	0	0	0	0	0
		70	0	0	0	0	0	0	0
		65	0	0	0	0	0	0	0
		60	0	0	0	0	0	0	0
	8.07%	80	0	0	0	0	0	0	0
		75	0	0	0	0	0	0	0
		70	0	0	0	0	0	0	0
		65	0	0	0	0	0	0	0
		60	0	0	0	0	0	1	1

	Security	% Val	Max. of (Prev. Day's MTM - Day's Hi) & (Prev. Day's MTM - Day's Lo)	Log of MTM Current Day To Previous day	Log of WAP Current Day To Previous day	Log of Day High To day Low	Log of Day High To Previous Day Low	Log of Day Low To Previous day High	
Oct - 2005	7.37%	80	0	0	0	0	0	0	
		75	0	0	0	0	0	0	
		70	0	0	0	0	0	0	
		65	0	0	0	0	0	0	
		60	0	0	0	0	0	1	
	10.25%	80	0	0	0	0	0	0	0
		75	0	0	0	0	0	0	0
		70	0	0	0	0	0	0	1
		65	0	0	0	0	0	0	2
		60	1	0	0	0	1	0	2
	8.07%	80	0	0	0	0	0	0	0
		75	0	0	0	0	0	0	0
		70	0	0	0	0	0	0	0
		65	0	0	0	0	0	0	0
		60	0	0	0	0	1	0	1

	Security	% Val	Max. of (Prev. Day's MTM - Day's Hi) & (Prev. Day's MTM - Day's Lo)	Log of MTM Current Day To Previous day	Log of WAP Current Day To Previous day	Log of Day High To day Low	Log of Day High To Previous Day Low	Log of Day Low To Previous day High	
Nov - 2005	7.37%	80	0	0	0	0	0	0	
		75	0	0	0	0	0	0	
		70	0	0	0	0	0	0	
		65	0	0	0	0	0	0	
		60	0	0	0	0	0	0	
	7.49%	80	0	0	0	0	0	0	0
		75	0	0	0	0	0	0	0
		70	0	0	0	0	0	0	0
		65	0	0	0	0	0	0	0
		60	0	0	0	1	0	1	0

	Security	% Val	Max. of (Prev. Day's MTM - Day's Hi) & (Prev. Day's MTM - Day's Lo)	Log of MTM Current Day To Previous day	Log of WAP Current Day To Previous day	Log of Day High To day Low	Log of Day High To Previous Day Low	Log of Day Low To Previous day High	
Dec - 2005	8.07%	80	0	0	0	0	0	0	
		75	0	0	0	0	0	0	
		70	0	0	0	0	0	0	
		65	0	0	0	0	0	0	
		60	0	0	0	0	0	0	
	10.25%	80	0	0	0	0	0	0	0
		75	0	0	0	0	0	0	0
		70	0	0	0	0	0	0	0
		65	0	0	0	0	0	0	0
		60	0	0	0	0	0	0	0