

21st February 2006

**Note On Valuation of State Government Securities  
& Risk Assessment for trades in such securities**

CCIL has been examining the issues relating to valuation of State government and other illiquid securities and risk assessment for trades in such securities for the last few years. A detailed note on this subject was put up in CCIL's website in February '05. Based on the paper and the feedback received from the members, meetings were organized at CCIL on 17<sup>th</sup> November 2005 and 14<sup>th</sup> February '06 to have further discussion in the matter. Major players in State Government securities market participated in the meeting. CCIL presented analysis based on trade data for the period August 2004 to December 2005.

2. Based on the discussions during the meeting, the following approach is now proposed to be adopted by CCIL for valuation of State government securities and for arriving at Margin Factors for such securities:

A. *Valuation*: CCIL would work out an Yield Spread on Sovereign ZCYC for valuation of State Government securities. The spread would be worked out from the trade data on State Government Securities. The underlying assumption will be that the spread remains same irrespective of the issuer (State Government) or of the tenor. The spread would be worked out at the end of each month and would usually be used throughout the next month. The detailed process is appended as Annexure - I.

B. *Margin factors for State Government securities*: As the risks for trades in State Government securities are higher due to significant illiquidity in the market and also due to high spread expected for any Buy/ Sale of a State Government security by CCIL under a condition of default, *an impact of illiquidity would be built into the margin factors applicable for illiquid securities*. The margin factors would be set as under:

- i) for Liquid securities (those which have more than 10 trades per day or more of Face Value of Rs. 5 crs. or more during the previous calendar quarter) - the value of their respective 3-day VaR numbers
- ii) for Semi-liquid securities (those having average of 1 to 10 trades per day of Face Value of Rs. 5 crs. or more in the previous calendar quarter) - *1.5 times* of their respective 3-day VaR numbers.
- iii) for Illiquid securities (those having average of less than 1 trade per day of Face Value of Rs. 5 crs. or more in the previous calendar quarter) - *2 times* their respective 3-day VaR numbers

In addition to values arrived at based on 3 day VaR as above, 0.25% will continue to get added to cover accrued interest for the period between the day of trade and the day of final settlement after a possible default.

3. An analysis of the effectiveness of the suggested process, based on the trade data for August '04 to Dec '05 is enclosed as Annexure II.

4. Members are requested to go through the same and provide their feedback by 5th March '06. Based on the feedback, CCIL will take a decision in regard to implementation of the same.
  
5. Feedbacks may please be directed to [rmd@ccilindia.co.in](mailto: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.

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**Methodology to be followed for arriving at  
Uniform Yield Spread for valuation of State Govt. Securities**

- All trades in State Government securities of face value of Rs. 5 crore or above will be taken into consideration.
- Apparent outliers will be excluded
- All trades for a month will be considered for arriving at the Uniform Yield Spread.
- Model prices for the traded securities will be first arrived at using Sovereign ZCYC rates.
- An optimization process will then be run to arrive at an Uniform Yield Spread over the respective zero rates across the Sovereign ZCYC curve which will allow minimizing the differences between the traded prices and the model prices (i.e. the price arrived at using the ZCYC of the day of trade and after applying the uniform spread as above), in 95% of the cases.
- The Yield Spread so arrived at will be notified to the members and would be brought into use on the day following the date of notification.
- The Yield Spreads will be reviewed at the end of each month (latest by 7 days from the end of the month) and will be used for valuation during the immediately following month.
- A back-testing of the effectiveness of using the yield spread will be run on a daily basis and summarized results will be made available to the members. This will show the extent of reduction achieved by using the Uniform Yield Spread in reducing the differences between the Traded Prices and Model Prices based on Sovereign ZCYC.
- In case of any sudden change in the market causing the spreads to change significantly (say by at least 5 basis point), if revealed through daily back-testing, CCIL may change the Yield Spread to be used for a month after duly notifying the members about such change.

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**ANNEXURE II**

**BACK TESTING RESULTS FROM AUGUST 2004 To DECEMBER 2005  
USING UNIFORM YIELD SPREAD**

Spread based on July '04 Trades	Extent Of Correction in Model Price For August '04 [Ratio of (Adj MP-WAP) / (MP-WAP)]							
0.397450461								
Extent Of Correction	> 2.00	<= 2 -> 1.50	<= 1.5 -> .1.00	<= 1.00 -> >.75	<= .75 -> >.50	<= .50 -< .25	<= .25 -> >.10	<= .10 & below
Maturity Bucket	A	B	C	D	E	F	G	H
>0 <=1;	-	-	-	-	2	2	-	-
>1<=3;	-	-	-	-	2	8	2	-
>3<=5;	-	-	-	-	-	10	11	9
>5<=7;	-	-	-	-	-	7	3	1
>7<=10;	3	3	1	1	3	6	5	-
>10<=15;	1	-	-	-	1	2	-	-
>15<=20;	-	-	-	-	-	-	-	-
>20<=25;	-	-	-	-	-	-	-	-
Percentages	4.82%	3.61%	1.20%	1.20%	9.64%	42.17%	25.30%	12.05%
Total No Of Trades**	83							
1) Reduction achieved in the difference between Existing Model price and Weighted Average Price:								90.36%
2) At least 50% reduction achieved								79.52%

Spread based on Aug '04 Trades	Extent Of Correction in Model Price For September '04 [Ratio of (Adj MP-WAP) / (MP-WAP)]							
0.45431861								
Extent Of Correction	> 2.00	<= 2 -> 1.50	<= 1.5 -> .1.00	<= 1.00 -> >.75	<= .75 -> >.50	<= .50 -< .25	<= .25 -> >.10	<= .10 & below
Maturity Bucket	A	B	C	D	E	F	G	H
>0 <=1;	-	-	-	-	1	8	-	-
>1<=3;	-	-	-	-	1	48	-	-
>3<=5;	-	-	-	-	-	72	15	1
>5<=7;	-	-	-	1	4	34	14	10
>7<=10;	-	4	1	2	2	7	6	5
>10<=15;	-	-	-	-	-	-	-	-
>15<=20;	-	-	-	-	-	-	-	-
>20<=25;	-	-	-	-	-	-	-	-
Percentages	0.00%	1.69%	0.42%	1.27%	3.39%	71.61%	14.83%	6.78%
Total No Of Trades**	236							
1) Reduction achieved in the difference between Existing Model price and Weighted Average Price:								97.88%
2) At least 50% reduction achieved								93.22%

Spread based on Sept '04 Trades 0.608887359	Extent Of Correction in Model Price For October '04 [Ratio of (Adj MP-WAP-WAP) / (MP-WAP)]							
Extent Of Correction	> 2.00	<= 2 -> 1.50	<= 1.5 -> .1.00	<= 1.00 - >.75	<= .75 - >.50	<= .50 -< .25	<= .25 - >.10	<= .10 & below
Maturity Bucket	A	B	C	D	E	F	G	H
>0 <=1;	-	-	-	-	-	-	-	-
>1<=3;	-	-	-	-	-	1	-	-
>3<=5;	-	-	-	-	2	14	-	-
>5<=7;	-	-	-	-	-	17	22	1
>7<=10;	-	1	1	1	-	2	20	5
>10<=15;	-	1	1	-	-	-	-	1
>15<=20;	-	-	-	-	-	-	-	-
>20<=25;	-	-	-	-	-	-	-	-
Percentages	0.00%	2.22%	2.22%	1.11%	2.22%	37.78%	46.67%	7.78%
Total No Of Trades**	90							
1) Reduction achieved in the difference between Existing Model price and Weighted Average Price:								95.56%
2) At least 50% reduction achieved								92.22%

Spread based on Oct '04 Trades 0.753182748	Extent Of Correction in Model Price For November '04 [Ratio of (Adj MP-WAP) / (MP-WAP)]							
Extent Of Correction	> 2.00	<= 2 -> 1.50	<= 1.5 -> .1.00	<= 1.00 - >.75	<= .75 - >.50	<= .50 -< .25	<= .25 - >.10	<= .10 & below
Maturity Bucket	A	B	C	D	E	F	G	H
>0 <=1;	-	-	-	-	2	-	-	-
>1<=3;	-	-	-	-	5	14	1	-
>3<=5;	-	-	-	-	-	27	16	1
>5<=7;	-	-	-	-	-	2	12	33
>7<=10;	-	-	-	1	-	-	1	1
>10<=15;	6	-	-	5	-	-	-	-
>15<=20;	-	-	-	-	-	-	-	-
>20<=25;	-	-	-	-	-	-	-	-
Percentages	4.72%	0.00%	0.00%	4.72%	5.51%	33.86%	23.62%	27.56%
Total No Of Trades**	127							
1) Reduction achieved in the difference between Existing Model price and Weighted Average Price:								95.28%
2) At least 50% reduction achieved								85.04%

Spread based on Nov '04 Trades 0.790241469	Extent Of Correction in Model Price For December '04 [Ratio of (Adj MP-WAP) / (MP-WAP)]							
Extent Of Correction	> 2.00	<= 2 -> 1.50	<= 1.5 -> .1.00	<= 1.00 -> >.75	<= .75 -> >.50	<= .50 -< .25	<= .25 -> >.10	<= .10 & below
Maturity Bucket	A	B	C	D	E	F	G	H
>0 <=1;	-	-	-	-	-	-	-	-
>1<=3;	-	-	-	-	-	4	16	24
>3<=5;	-	-	-	-	-	2	35	20
>5<=7;	-	-	-	-	1	26	38	28
>7<=10;	-	-	2	11	7	4	4	1
>10<=15;	-	-	4	4	3	1	-	-
>15<=20;	-	-	-	-	-	-	-	-
>20<=25;	-	-	-	-	-	-	-	-
Percentages	0.00%	0.00%	2.55%	6.38%	4.68%	15.74%	39.57%	31.06%
Total No Of Trades**	235							
1) Reduction achieved in the difference between Existing Model price and Weighted Average Price:								97.45%
2) At least 50% reduction achieved								86.38%

Spread based on Dec '04 Trades 0.632314701	Extent Of Correction in Model Price For January '05 [Ratio of (Adj MP-WAP) / (MP-WAP)]							
Extent Of Correction	> 2.00	<= 2 -> 1.50	<= 1.5 -> .1.00	<= 1.00 -> >.75	<= .75 -> >.50	<= .50 -< .25	<= .25 -> >.10	<= .10 & below
Maturity Bucket	A	B	C	D	E	F	G	H
>0 <=1;	-	-	-	-	-	-	-	-
>1<=3;	-	-	-	-	-	-	4	7
>3<=5;	-	-	-	-	-	-	2	2
>5<=7;	-	-	1	1	-	5	17	12
>7<=10;	4	-	2	11	8	5	10	-
>10<=15;	1	-	3	5	-	-	-	-
>15<=20;	-	-	-	-	-	-	-	-
>20<=25;	-	-	-	-	-	-	-	-
Percentages	5.00%	0.00%	6.00%	17.00%	8.00%	10.00%	33.00%	21.00%
Total No Of Trades**	100							
1) Reduction achieved in the difference between Existing Model price and Weighted Average Price:								89.00%
2) At least 50% reduction achieved								64.00%

Spread based on Jan '05 Trades 0.441336927	Extent Of Correction in Model Price For February '05 [Ratio of (Adj MP-WAP) / (MP-WAP)]							
Extent Of Correction	> 2.00	<= 2 -> 1.50	<= 1.5 -> .1.00	<= 1.00 -> >.75	<= .75 -> >.50	<= .50 -< .25	<= .25 -> >.10	<= .10 & below
Maturity Bucket	A	B	C	D	E	F	G	H
>0 <=1;	-	-	-	-	-	-	-	-
>1<=3;	-	-	-	-	-	-	5	-
>3<=5;	-	-	-	-	-	2	-	-
>5<=7;	-	-	-	-	-	13	28	-
>7<=10;	-	-	-	1	1	-	2	5
>10<=15;	-	-	-	-	1	8	-	-

>15<=20;	-	-	-	-	-	-	-	-
>20<=25;	-	-	-	-	-	-	-	-
Percentages	0.00%	0.00%	0.00%	1.52%	3.03%	34.85%	53.03%	7.58%
Total No Of Trades**	66							
1) Reduction achieved in the difference between Existing Model price and Weighted Average Price:								100.00%
2) At least 50% reduction achieved								95.45%

Spread based on Feb'05 Trades	Extent Of Correction in Model Price For March '05 [Ratio of (Adj MP-WAP) / (MP-WAP)]							
0.471801886								
Extent Of Correction	> 2.00	<= 2 -> 1.50	<= 1.5 -> .1.00	<= 1.00 -> .75	<= .75 -> .50	<= .50 -> .25	<= .25 -> .10	<= .10 & below
Maturity Bucket	A	B	C	D	E	F	G	H
>0 <=1;	-	-	-	-	-	-	-	-
>1<=3;	-	-	-	-	-	1	-	-
>3<=5;	-	1	-	-	-	2	2	2
>5<=7;	-	-	-	-	-	3	7	2
>7<=10;	7	-	-	2	-	4	6	13
>10<=15;	-	1	6	7	3	3	-	1
>15<=20;	-	-	-	-	-	-	-	-
>20<=25;	-	-	-	-	-	-	-	-
Percentages	9.59%	2.74%	8.22%	12.33%	4.11%	17.81%	20.55%	24.66%
Total No Of Trades**	73							
1) Reduction achieved in the difference between Existing Model price and Weighted Average Price:								79.45%
2) At least 50% reduction achieved								63.01%

Spread based on Mar '05 Trades	Extent Of Correction in Model Price For April '05 [Ratio of (Adj MP-WAP) / (MP-WAP)]							
0.329031921								
Extent Of Correction	> 2.00	<= 2 -> 1.50	<= 1.5 -> .1.00	<= 1.00 -> .75	<= .75 -> .50	<= .50 -> .25	<= .25 -> .10	<= .10 & below
Maturity Bucket	A	B	C	D	E	F	G	H
>0 <=1;	-	-	-	-	-	-	-	-
>1<=3;	-	-	-	-	-	-	-	-
>3<=5;	-	-	-	-	-	-	-	-
>5<=7;	-	-	-	1	-	1	4	4
>7<=10;	1	-	-	-	-	2	5	-
>10<=15;	4	-	-	-	-	-	-	-
>15<=20;	-	-	-	-	-	-	-	-
>20<=25;	-	-	-	-	-	-	-	-
Percentages	22.73%	0.00%	0.00%	4.55%	0.00%	13.64%	40.91%	18.18%
Total No Of Trades**	22							
1) Reduction achieved in the difference between Existing Model price and Weighted Average Price:								77.27%
2) At least 50% reduction achieved								72.73%

Spread based on Apr '05 Trades 0.24701656	Extent Of Correction in Model Price For May '05 [Ratio of (Adj MP-WAP) / (MP-WAP)]							
Extent Of Correction	> 2.00	<= 2 -> 1.50	<= 1.5 -> .1.00	<= 1.00 -> >.75	<= .75 -> >.50	<= .50 -> >.25	<= .25 -> >.10	<= .10 & below
Maturity Bucket	A	B	C	D	E	F	G	H
>0 <=1;	-	-	-	-	-	-	-	-
>1<=3;	-	-	-	-	-	-	-	-
>3<=5;	1	-	-	-	2	3	-	-
>5<=7;	-	-	-	-	5	6	3	9
>7<=10;	-	-	-	-	-	1	2	2
>10<=15;	1	-	-	-	14	61	-	-
>15<=20;	-	-	-	-	-	-	-	-
>20<=25;	-	-	-	-	-	-	-	-
Percentages	1.82%	0.00%	0.00%	0.00%	19.09%	64.55%	4.55%	10.00%
Total No Of Trades**	110							
1) Reduction achieved in the difference between Existing Model price and Weighted Average Price:								98.18%
2) At least 50% reduction achieved								79.09%

Spread based on May '05 Trades 0.42384738	Extent Of Correction in Model Price For June '05 [Ratio of (Adj MP-WAP) / (MP-WAP)]							
Extent Of Correction	> 2.00	<= 2 -> 1.50	<= 1.5 -> .1.00	<= 1.00 -> >.75	<= .75 -> >.50	<= .50 -> >.25	<= .25 -> >.10	<= .10 & below
Maturity Bucket	A	B	C	D	E	F	G	H
>0 <=1;	-	-	-	-	-	-	-	-
>1<=3;	-	-	-	-	-	1	1	-
>3<=5;	-	-	-	-	-	20	7	4
>5<=7;	-	-	-	-	-	12	25	11
>7<=10;	-	-	-	-	7	21	16	27
>10<=15;	-	-	-	1	2	2	-	-
>15<=20;	-	-	-	-	-	-	-	-
>20<=25;	-	-	-	-	-	-	-	-
Percentages	0.00%	0.00%	0.00%	0.64%	5.73%	35.67%	31.21%	26.75%
Total No Of Trades**	157							
1) Reduction achieved in the difference between Existing Model price and Weighted Average Price:								100.00%
2) At least 50% reduction achieved								93.63%

Spread based on June '05 Trades 0.413715105	Extent Of Correction in Model Price For July '05 [Ratio of (Adj MP-WAP) / (MP-WAP)]							
Extent Of Correction	> 2.00	<= 2 -> 1.50	<= 1.5 -> .1.00	<= 1.00 -> >.75	<= .75 -> >.50	<= .50 -> >.25	<= .25 -> >.10	<= .10 & below
Maturity Bucket	A	B	C	D	E	F	G	H
>0 <=1;	-	-	-	-	-	-	-	-
>1<=3;	-	-	-	-	-	-	-	-
>3<=5;	-	-	-	-	-	-	18	-
>5<=7;	-	-	1	2	-	-	-	-
>7<=10;	-	2	16	5	5	1	4	-
>10<=15;	1	-	-	-	-	-	-	-
>15<=20;	-	-	-	-	-	-	-	-
>20<=25;	-	-	-	-	-	-	-	-



Percentages	1.82%	3.64%	30.91%	12.73%	9.09%	1.82%	40.00%	0.00%
Total No Of Trades**	55							
1) Reduction achieved in the difference between Existing Model price and Weighted Average Price:								63.64%
2) At least 50% reduction achieved								41.82%

Spread based on July '05 Trades	Extent Of Correction in Model Price For Aug '05 [Ratio of (Adj MP-WAP) / (MP-WAP)]							
0.265363947								
Extent Of Correction	> 2.00	<= 2 -> 1.50	<= 1.5 -> .1.00	<= 1.00 -> .75	<= .75 -> .50	<= .50 -> .25	<= .25 -> .10	<= .10 & below
Maturity Bucket	A	B	C	D	E	F	G	H
>0 <=1;	-	-	-	-	-	-	-	-
>1 <=3;	-	-	-	-	1	4	1	2
>3 <=5;	1	-	-	-	1	10	4	3
>5 <=7;	-	-	-	-	-	3	3	2
>7 <=10;	-	1	3	4	9	7	18	12
>10 <=15;	-	-	-	-	-	1	-	-
>15 <=20;	-	-	-	-	-	-	-	-
>20 <=25;	-	-	-	-	-	-	-	-
Percentages	1.11%	1.11%	3.33%	4.44%	12.22%	27.78%	28.89%	21.11%
Total No Of Trades**	90							
1) Reduction achieved in the difference between Existing Model price and Weighted Average Price:								94.44%
2) At least 50% reduction achieved								77.78%

Spread based on Aug '05 Trades	Extent Of Correction in Model Price For Sept '05 [Ratio of (Adj MP-WAP) / (MP-WAP)]							
0.248939246								
Extent Of Correction	> 2.00	<= 2 -> 1.50	<= 1.5 -> .1.00	<= 1.00 -> .75	<= .75 -> .50	<= .50 -> .25	<= .25 -> .10	<= .10 & below
Maturity Bucket	A	B	C	D	E	F	G	H
>0 <=1;	-	-	-	-	-	-	-	-
>1 <=3;	-	-	-	-	4	6	-	-
>3 <=5;	-	-	-	-	-	22	15	5
>5 <=7;	-	-	-	2	3	11	8	-
>7 <=10;	-	-	-	-	-	5	10	4
>10 <=15;	-	-	-	-	-	11	8	16
>15 <=20;	-	-	-	-	-	-	-	-
>20 <=25;	-	-	-	-	-	-	-	-
Percentages	0.00%	0.00%	0.00%	1.54%	5.38%	42.31%	31.54%	19.23%
Total No Of Trades**	130							
1) Reduction achieved in the difference between Existing Model price and Weighted Average Price:								100.00%
2) At least 50% reduction achieved								93.08%

Spread based on Sept '05 Trades 0.276104283	Extent Of Correction in Model Price For Oct '05 [Ratio of (Adj MP-WAP) / (MP-WAP)]							
Extent Of Correction	> 2.00	<= 2 -> 1.50	<= 1.5 -> .1.00	<= 1.00 -> >.75	<= .75 -> >.50	<= .50 -< .25	<= .25 -> >.10	<= .10 & below
Maturity Bucket	A	B	C	D	E	F	G	H
>0 <=1;	-	-	-	-	-	-	-	-
>1<=3;	-	-	-	-	-	-	-	-
>3<=5;	-	-	-	-	-	-	-	-
>5<=7;	-	-	-	3	3	6	-	1
>7<=10;	-	-	-	2	3	20	25	3
>10<=15;	-	-	-	-	-	-	-	-
>15<=20;	-	-	-	-	-	-	-	-
>20<=25;	-	-	-	-	-	-	-	-
Percentages	0.00%	0.00%	0.00%	7.58%	9.09%	39.39%	37.88%	6.06%
Total No Of Trades**	66							
1) Reduction achieved in the difference between Existing Model price and Weighted Average Price:								100.00%
2) At least 50% reduction achieved								83.33%

Spread based on Oct '05 Trades 0.215579523	Extent Of Correction in Model Price For Nov '05 [Ratio of (Adj MP-WAP) / (MP-WAP)]							
Extent Of Correction	> 2.00	<= 2 -> 1.50	<= 1.5 -> .1.00	<= 1.00 -> >.75	<= .75 -> >.50	<= .50 -< .25	<= .25 -> >.10	<= .10 & below
Maturity Bucket	A	B	C	D	E	F	G	H
>0 <=1;	-	-	-	-	-	-	-	-
>1<=3;	-	-	-	-	-	-	-	-
>3<=5;	-	-	-	-	4	7	3	-
>5<=7;	-	-	-	-	-	2	8	7
>7<=10;	-	-	-	2	2	9	20	10
>10<=15;	-	-	-	-	-	-	-	-
>15<=20;	-	-	-	-	-	-	-	-
>20<=25;	-	-	-	-	-	-	-	-
Percentages	0.00%	0.00%	0.00%	2.70%	8.11%	24.32%	41.89%	22.97%
Total No Of Trades**	74							
1) Reduction achieved in the difference between Existing Model price and Weighted Average Price:								100.00%
2) At least 50% reduction achieved								89.19%

Spread based on Dec '05 Trades 0.195842735	Extent Of Correction in Model Price For Dec '05 [Ratio of (Adj MP-WAP) / (MP-WAP)]							
Extent Of Correction	> 2.00	<= 2 -> 1.50	<= 1.5 -> .1.00	<= 1.00 -> >.75	<= .75 -> >.50	<= .50 -< .25	<= .25 -> >.10	<= .10 & below
Maturity Bucket	A	B	C	D	E	F	G	H
>0 <=1;	-	-	-	-	-	-	-	-
>1<=3;	-	-	-	-	-	-	-	-
>3<=5;	-	-	-	-	1	16	-	-
>5<=7;	-	-	-	-	-	12	5	-
>7<=10;	-	1	-	3	3	14	16	9
>10<=15;	-	-	-	1	-	-	-	-

>15<=20;	-	-	-	-	-	-	-	-
>20<=25;	-	-	-	-	-	-	-	-
Percentages	0.00%	1.23%	0.00%	4.94%	4.94%	51.85%	25.93%	11.11%
Total No Of Trades**	81							
1) Reduction achieved in the difference between Existing Model price and Weighted Average Price:								98.77%
2) At least 50% reduction achieved								88.89%