



S.R. No. 006
01/2016/CEFT

Estimation of Base Line and Optimal Credit Deposit Ratio in Odisha

1. Backdrop

Bank Credit plays a pivotal role to induce economic growth and, the penetration of credit could be measured in terms of credit deployed against the deposit received, technically it is denoted by Credit-Deposit Ratio. C-D Ratio is the funds deployed as loans & advance from the resources mobilized through deposits by the Banks.

Historically, the issue of C D ratio across the states in India has been debated in the context of regional growth and development due to unequal deployment bank credit.

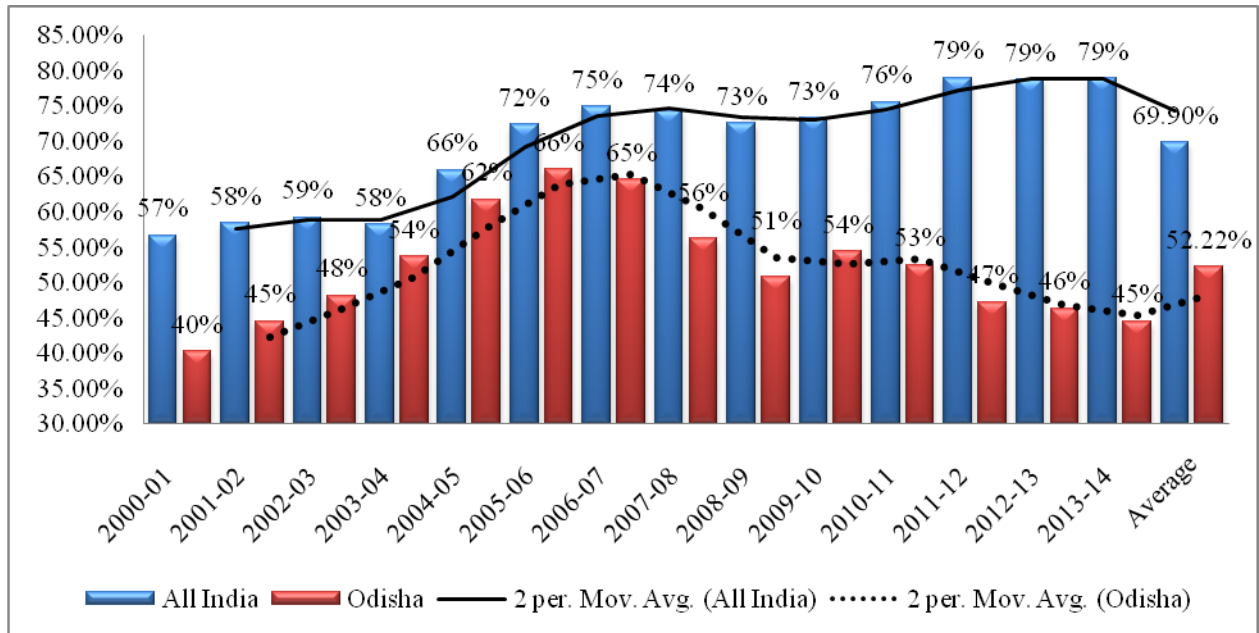
1.2 Trends of the CD Ratio of the state of Odisha

Since, the focus of the paper is on CD Ratio of All States in India in general and Odisha in particular, the average CD Ratio All States (All India) is compared CD Ratio of Odisha.¹

The trend in CD-Ratio of Odisha and All India (Chart 1) shows a very low CD Ratio as compared to CD Ratio of All India. The average CD Ratio during FY 2000-01 to FY 2013-14 is calculated at 70% as against the 52% in case of Odisha.

¹ All India CD Ratio is average of All States CD Ratio.

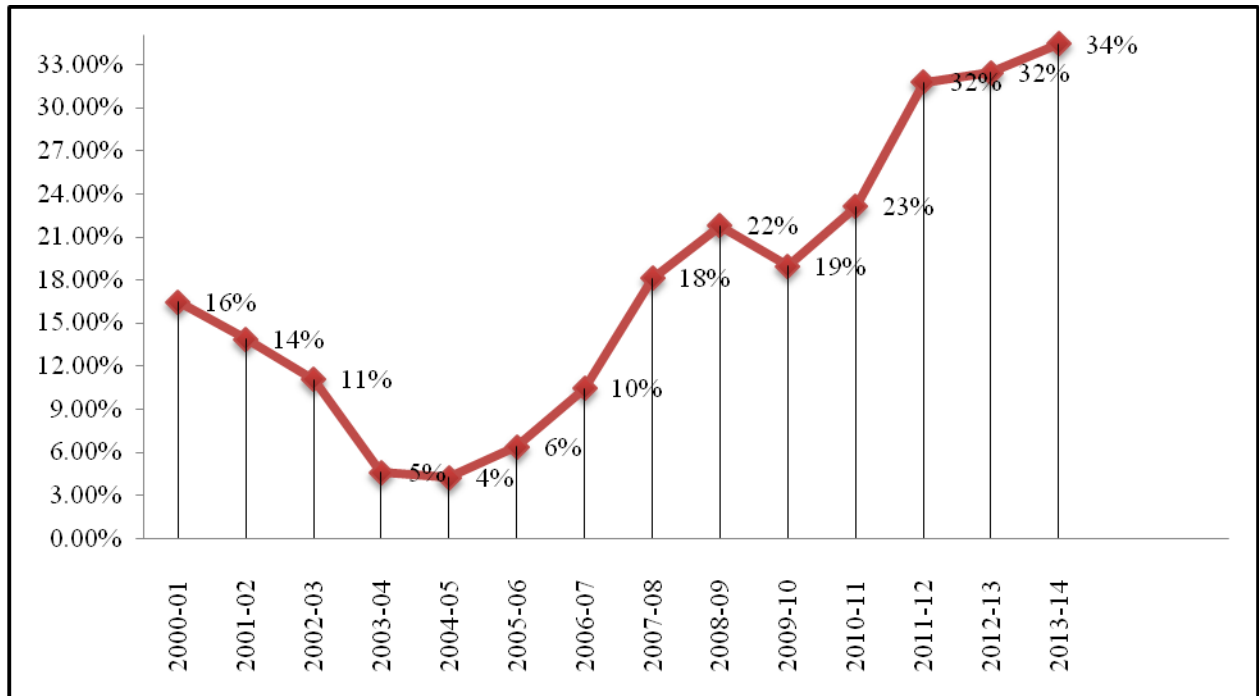
Chart 1: Trends in C-D Ratio



Source: Various Volumes of ‘Basic Statistical Returns of Scheduled Commercial Banks in India’ Published by RBI.

It is also observed that the gap in CD Ratio between All India and Odisha has widened since FY 2004-05 (Chart 2).

Chart 2: Gap in C-D Ratio



Source: Various Volumes of ‘Basic Statistical Returns of Scheduled Commercial Banks in India’ published by RBI.

The following table gives a comparative position of CD Ratio of All India Average, Odisha and gap in CD Ratio. The CD Ratio in Odisha is quite low to as compared to all India as evidenced from the descriptive statistics.

Table 1: Descriptive Statistics of CD Ratio

	All India	Odisha	Gap
Mean	69.90%	52.22%	17.68%
Median	72.61%	50.84%	16.47%
Minimum	56.71%	40.24%	4.21%
Maximum	79.02%	66.04%	34.41%

The average CD Ratio of all states is higher by 17.68% as compared to Odisha during FY 2000-01 to FY 2012-13.

1.2 CD Ratio in Odisha: SLBC Data and RBI Data

Table 2: SLBC vs RBI

Year	RBI (1)	SLBC1(2)	Difference (2 - 1)	SLBC2 (3)	Difference (3 - 1)
2007-08	56.27%	69.92%	13.65%	NA	NA
2008-09	50.84%	61.65%	10.80%	NA	NA
2009-10	54.38%	62.85%	8.47%	NA	NA
2010-11	52.51%	63.05%	10.54%	NA	NA
2011-12	47.26%	70.25%	22.99%	51.25%	3.98%
2012-13	46.34%	86.01%	39.67%	51.54%	5.20%
2013-14	44.55%	84.09%	39.54%	53.16%	8.61%
Average	50.31%	71.12%	20.81%	51.98%	1.67%

***SLBC1: CD Ratio on utilisationBasis,**

***SLBC2: CD Ratio on Sanction &Utilisation Basis**

Source: RBI and State Level Banker’s Committee, Odisha(SLBC)

State Level Banker's Committee, Odisha publishes the data on CD Ratio of Odisha both on utilisation and sanction & utilisation basis.²SLBC Data is available (<http://www.slbcorissa.com/>) since FY 2007-08 on utilisation basis. The data on sanction & utilisation is available since FY 2011-12. It is observed (Table 2) that SLBC data on CD Ratio is overestimated over RBI data. On utilization basis, the CD Ratio of SLBC data is over estimated by 20.81% on yearly average basis over RBI data during FY 2007-08 to FY 2013-14. On sanction & utilisation basis, the SLBC data is overestimated by 1.67% on yearly average basis during FY 2011-12 to FY 2013-14.

2. Objective of the Study

In this backdrop, this study analyses CD Ratio of twenty one states in India in order to empirically examine its importance on growth in Gross State Domestic Product (GSDP) and State Own Tax Revenue (SOTR) of these twenty one states.

The objectives of this study are:

1. To examine the causal relationship between Credit-Deposit Ratio and GSDP growth of twenty one states in India
2. To examine the causal relationship between Credit-Deposit Ratio and Tax-GSDP Ratio of twenty one states in India
3. To investigate the long run equilibrium relationship between Credit-Deposit Ratio and GSDP growth
4. To investigate the long run equilibrium relationship between Credit-Deposit Ratio and State Own Tax Revenue (SOTR)
5. To estimate the impact of Credit-Deposit Ratio on GSDP growth and SOTR
6. To calculate the optimal CD Ratio for Odisha

²Utilization basis includes credit utilized in Odisha which is sanctioned both in Odisha and outside Odisha whereas Sanction & utilization basis includes credit utilized in Odisha that is sanctioned in Odisha only.

3. Methodology and Empirical Models

To achieve these objectives, the following methodology and empirical models have been used for the study.

- To establish the causality, Pairwise DumitrescuHurlin Panel Causality Test has been applied.
- To examine the long term relationship, Pedroni Residual Co-integration Test is adopted.
- To estimate the impact of CD Ratio, Panel GMM EGLS model with Cross Section Random Effects is used. The panel models are given in equations given below.

$$CD\ Ratio = \alpha_1 + \beta_1(GSDP) + \varepsilon_1 \quad (1)$$

$$CD\ Ratio = \alpha_2 + \beta_2(SOTR) + \varepsilon_2 \quad (2)$$

Where, β_1 & β_2 are coefficients and ε_1 & ε_2 are the error terms

4. Data Sources

Annual Data on CD Ratio spanning from FY 2000-2001 to FY 2013-14 for twenty one states (excluding North-Eastern States) has been taken from Various Volumes of ‘Basic Statistical Returns of Scheduled Commercial Banks in India’ published by RBI. Data on real growth rate of GSDP (at 2004-05 prices) and State Own Tax Revenue as proportion of GSDP (SOTR) for these twenty one states during the same period have been sourced from EPW Research Foundation database.

5. Results & Analysis

1. CD Ratio, GSDP growth rate and SOTR are stationary at first difference (Technical Note 1).
2. CD Ratio and GSDP growth rates have bidirectional causal relationship. In other words, CDR causes to economic growth of the states and economic growth of the states causes to CDR. Therefore, CDR and GSDP growth of the states are interdependent (Technical Note -2).

3. CDR and GSDP growth of the states have long run equilibrium relationship, indicating that the co-existence of CDR and GSDP growth. (Technical Note -3).

CD Ratio has growth inducing effect. Higher economic growth and more economic activities further induce demand for more credit in order to continue with economic activities.

4. **10 % rise in the CDR will lead 3.65%rise in the real GSDP growth** (Technical Note - 4).
5. CDR and SOTR have unidirectional causal relationship, wherein, CDR impacts SOTR(Technical Note - 5).
6. The long run equilibrium relationship between CDR and SOTR is established indicating the co-existence of CDR & SOTR(Technical Note -6).

The higher economic growth induced by raising CD Ratio will trigger more trade & commerce and business opportunities which in turn help the states to mobilise more tax revenue.

7. **10%rise in the CDR will lead to 2.85% increase in the SOTR** (Technical Note -7).

6. Baseline and Optimal CD Ratio for Odisha &Policy Intervention

- The minimum SLR is 21.5% and CRR is 4%.
- As on December 2015, the SLR maintained by the Banking Sector is 29.34% which is 7.84% higher than the minimum prescribed limit. The higher SLR balance is because of subdued credit demand and higher yield in Govt. Securities.
- Cash in Hand and Balances with RBI ratio is at 5.14%. This includes CRR of 4% and Cash Balance Ratio of 1.14%.
- To estimate the Optimal CD Ratio for Odisha, it is assumed that out of total deposits mobilized from Odisha, Banks will maintain a SLR of 30% and Cash Ratio(Cash in Hand and Balances with RBI) of 6%.
- Considering flight of deposits to the extent of 2% to the outside Odisha, **the baseline CD Ratio is calculated at 62%.**

- **The Optimal CD Ratio is calculated at 68%** which is much lower than all India CD Ratio of 79%.
- **The impact of baseline CD ratio will have incremental effect on real GSDP growth rate by 3.28% and on SOTR by 2.57% on year average basis over a period of 10 Years.**
- **The impact of optimal CD ratio will have incremental effect on real GSDP growth rate by 5.48% and on SOTR by 4.28% on year average basis over a period of 10 Years.**
- **The CD Ratio by the SLBC is to be calculated on sanction & utilisation basis, not on utilization basis.**
- **There is a need for accuracy check of the SLBC data.**
- **The calculation of both baseline and optimal CD Ratio is given in table given below.**

Table 3: Base Line and Optimal CD Ratio

Minimum SLR	Minimum CRR	Current SLR	Current CRR
1	2	3	4
21.50%	4%	29.34%	5.14%
Baseline SLR	Baseline CRR	Permissible level of Flight of Deposit	Baseline CD Ratio
5	6	7	8 (1-30%-6%-2%)
30%	6%	2%	62%
Optimal SLR	Optimal CRR	Permissible level of Flight of Deposit	Optimal CD Ratio
5	6	7	8 (1-25%-5%-2%)
25%	5%	2%	68%
Average CDR in last 14 Years	Baseline Incremental CDR	Baseline Impact on incremental Real GSDP Growth	Baseline Impact on incremental SOTR
53%	9%	3.28%	2.57%

Average CDR in last 14 Years	Optimal Incremental CDR	Baseline Impact on incremental Real GSDP Growth	Baseline incremental Impact on SOTR
53%	15%	5.48%	4.28%

Technical Note

- To see the stationarity property of the Panel Data that used in the analysis are presented in Technical Note -1. Four Panel Unit Root Tests, viz., Levin, Lin & Chu; Im, Pesaran and Shin; ADF-Fisher and PP-Fisher are used in the study. The most acceptable result is that all variables are stationary at first difference.

Technical Note -1

Panel Unit Root Test for all variables used in the analysis								
Variable	Levin, Lin & Chu (t-stat)		Im, Pesaran and Shin (W-stat)		ADF-Fisher (Chi-square)		PP- Fisher (Chi-square)	
	P-value (Level)	P-value (1 st diff)	P-value (Level)	P-value (1 st diff)	P-value (Level)	P-value (1 st diff)	P-value (Level)	P-value (1 st diff)
Credit(C)	0.07	0.00	1.00	0.00	1.00	0.00	0.99	0.00
Deposit(D)	1.00	0.00	1.00	0.00	1.00	0.00	1.00	0.00
CD Ratio	0.00	0.00	0.86	0.00	0.90	0.00	0.98	0.00
Tax Rev.(TR)	1.00	0.00	1.00	0.00	1.00	0.00	1.00	0.00
L(TR)	1.00	0.00	1.00	0.00	1.00	0.00	1.00	0.00
GSDP	1.00	0.00	1.00	0.00	1.00	0.00	1.00	0.00
L(GSDP)	1.00	0.00	1.00	0.00	1.00	0.00	1.00	0.00
TR/GSDP	0.54	0.00	0.71	0.00	0.78	0.00	0.04	0.00

2. After testing the Panel Unit Root, we examined the causal relationship between CD-Ratio and GSDP growth rate. The Pairwise DumitrescuHurlin Panel Causality Tests has been applied in the analysis. The results are presented in Technical Note -2. Bidirectional Panel Causality between CD-Ratio and GSDP growth rate is established.

Technical Note -2

Pairwise DumitrescuHurlin Panel Causality Tests (Lags-1)			
Null Hypothesis	W-Stat.	Zbar-Stat.	Prob.
CDR does not homogeneously cause L(GSDP)	3.28021	4.29714	0.0000
L(GSDP) does not homogeneously cause CDR	2.88884	3.46877	0.0005

3. The long run Equilibrium relationship between CD-Ratio and GSDP growth rate is examine through the Panel Co-integration method, namely, Pedroni Residual Co-integration Test. The results is depicted in Technical Note -3. The Panel Co-integration test through various statistics, viz., Panel v-Statistic, Panel rho-Statistic, Panel PP-Statistic, Panel ADF-Statistic, Group rho-Statistic, Group PP-Statistic and Group ADF-Statistic, validate the Co-integration Relationship between CD-Ratio and GSDP growth rate.

Technical Note -3

Pedroni Residual Cointegration Test				
	Statistic	Prob.	Weighted Statistic	Prob.
Alternative hypothesis: common AR coefs. (within-dimension)				
Panel v-Statistic	114.4616	0.0000	94.26824	0.0000
Panel rho-Statistic	0.593035	0.7234	1.101837	0.8647
Panel PP-Statistic	-3.550992	0.0002	-2.844953	0.0022
Panel ADF-Statistic	-4.132963	0.0000	-3.387288	0.0004
Alternative hypothesis: individual AR coefs. (between-dimension)				
Group rho-Statistic	2.601460	0.9954		

Group PP-Statistic	-3.080790	0.0010		
Group ADF-Statistic	-4.416474	0.0000		

4. After the Co-integration relationship the coefficient of CD-Ratio and GSDP growth rate is presented in Technical Note -4. The Panel GMM EGLS with Cross Section Random Effects is used to estimate the coefficient of CDR, (3.65), which is statistically significant at 1% significance level.

Technical Note-4

Dependent Variable: LGS					
Method: Panel GMM EGLS (Cross-section random effects)					
Sample (adjusted): 2004 2014					
Periods included: 11					
Cross-sections included: 21					
Total panel (balanced) observations: 231					
2SLS instrument weighting matrix					
Wallace and Hussain estimator of component variances					
White cross-section standard errors & covariance (d.f. corrected)					
Instrument specification: C PCDR(-1) PCDR(-2) PCDR(-3)					
Constant added to instrument list					
Variable	Coefficient	Std. Error	t-Statistic	Prob.	
C	14.42833	0.672721	21.44771	0.0000	
CDR	3.652987	0.467012	7.822044	0.0000	
Effects Specification				S.D.	Rho
Cross-section random			0.638399	0.7118	
Idiosyncratic random			0.406202	0.2882	
Weighted Statistics					
R-squared	0.316237	Mean dependent var	3.128992		
Adjusted R-squared	0.313251	S.D. dependent var	0.495893		
S.E. of regression	0.410948	Sum squared resid	38.67308		
Durbin-Watson stat	0.199687	J-statistic	51.57765		
Instrument rank	4	Prob(J-statistic)	0.000000		

5. To examine the relationship between CDR and SOTR, the Pairwise DumitrescuHurlin Panel Causality Tests has been applied (Technical Note – 5). CDR causes SOTR but not vice versa.

Technical Note - 5

Pairwise DumitrescuHurlin Panel Causality Tests (Lags-1)			
Null Hypothesis	W-Stat.	Zbar-Stat.	Prob.
CDR does not homogeneously cause TR/GSDP	2.25117	2.11908	0.0341
TR/GSDP does not homogeneously cause CDR	1.08377	-0.35184	0.7250

6. The long run Equilibrium relationship between CD-Ratio and SOTR is presented in Technical Note – 6. The Pedroni Residual Co-integration Test has been used to test Co-integration relationship between these two variable. In the Co-integration test, out of eleven test statistics seven test statistics are found to statistically significant at below 5 percentage significance level, which reveal that the long run relationship exists between CDR and SOTR.

Technical Note - 6

Pedroni Residual Cointegration Test				
	<u>Statistic</u>	<u>Prob.</u>	<u>Weighted Statistic</u>	<u>Prob.</u>
Panel v-Statistic	1.563064	0.0590	0.583423	0.2798
Panel rho-Statistic	-1.763189	0.0389	-0.744118	0.2284
Panel PP-Statistic	-4.049068	0.0000	-1.561177	0.0592
Panel ADF-Statistic	-4.924789	0.0000	-2.157655	0.0155
Alternative hypothesis: individual AR coefs. (between-dimension)				
Group rho-Statistic	1.024142	0.8471		

Group PP-Statistic	-1.165040	0.1220		
Group ADF-Statistic	-3.345417	0.0004		

7. To estimate the coefficient of CDR, we used the Panel GMM EGLS with cross random effects model. The result is presented in Technical Note-7. The coefficient of CDR (2.85) is statistically significance at 1% level.

Technical Note: 7

Dependent Variable: SOTR					
Method: Panel GMM EGLS (Cross-section random effects)					
Sample (adjusted): 2004 2014					
Periods included: 11					
Cross-sections included: 21					
Total panel (balanced) observations: 231					
2SLS instrument weighting matrix					
Wallace and Hussain estimator of component variances					
Instrument specification: C PCDR(-1) PCDR(-2) PCDR(-3)					
Constant added to instrument list					
Variable	Coefficient	Std. Error	t-Statistic	Prob.	
C	5.359424	0.483259	11.09016	0.0000	
CDR	2.848702	0.579924	4.912200	0.0000	
Effects Specification				S.D.	Rho
Cross-section random			1.532278	0.8305	
Idiosyncratic random			0.692297	0.1695	
Weighted Statistics					
R-squared	0.079550	Mean dependent var	0.952770		
Adjusted R-squared	0.075531	S.D. dependent var	0.692341		
S.E. of regression	0.665681	Sum squared resid	101.4771		
Durbin-Watson stat	0.639299	J-statistic	4.283643		
Instrument rank	4	Prob(J-statistic)	0.117441		

Appendix-II

Credit-Deposit Ratio(in %) of All Indian States (excluding North-Eastern States)

Year	HR	HP	J&M	PB	RJ	DL	BR	JH	OD	WB	CH	MP	UP	UT	GO	GJ	MH	AP	KR	KE	TN	IND
Mar-01	41.0	21.3	34.5	41.1	46.6	66.1	20.7	28.0	40.2	44.5	38.5	47.6	28.3	21.7	26.1	48.5	86.4	64.5	61.0	43.3	90.6	56.7
Mar-02	43.7	23.4	36.8	41.8	48.4	67.6	21.3	25.1	44.5	45.8	44.0	46.6	29.9	23.7	25.3	44.1	92.3	61.9	61.6	43.3	85.4	58.4
Mar-03	44.0	24.8	36.5	41.5	50.8	65.8	23.1	25.1	48.2	47.9	35.1	46.6	30.6	19.4	24.2	44.8	93.7	62.4	62.3	42.8	90.7	59.2
Mar-04	47.6	29.7	37.4	43.1	55.7	59.9	24.9	26.3	53.7	49.5	40.0	46.9	33.1	21.1	21.7	42.2	81.8	65.9	63.1	45.5	93.1	58.2
Mar-05	51.4	36.3	46.7	50.1	68.7	62.4	27.7	29.6	61.8	52.3	43.6	54.7	37.9	24.3	25.1	46.5	94.9	74.8	73.8	54.6	101.2	66.0
Mar-06	57.4	41.0	47.2	56.8	77.3	67.4	30.3	31.2	66.0	56.3	45.5	60.5	41.0	25.8	23.2	55.6	102.2	81.3	75.9	61.4	110.5	72.4
Mar-07	56.9	42.8	62.5	65.6	82.9	70.8	32.4	32.8	64.6	64.7	50.0	61.8	45.1	26.7	26.2	63.7	96.8	87.3	76.3	60.9	114.5	75.0
Mar-08	60.1	43.4	56.4	67.2	82.4	66.9	28.2	35.3	56.3	62.4	49.8	60.1	43.7	26.2	29.4	66.5	93.9	90.4	78.1	63.4	114.7	74.4
Mar-09	61.4	38.6	47.2	65.7	80.6	68.9	26.8	32.0	50.8	60.7	46.3	57.4	42.2	25.3	26.7	63.7	91.2	96.4	77.3	59.7	108.1	72.6
Mar-10	63.3	42.2	46.4	71.5	88.4	74.6	29.0	35.1	54.4	61.5	52.3	60.6	43.3	33.7	26.5	65.3	82.9	105.1	77.6	63.1	113.8	73.3
Mar-11	71.7	41.6	38.1	77.8	90.4	86.8	29.5	34.4	52.5	63.7	52.3	55.6	44.0	35.4	29.1	66.2	83.0	109.7	72.7	73.1	115.1	75.6
Mar-12	79.4	38.9	33.8	80.9	90.9	95.6	29.7	33.9	47.3	63.8	53.6	56.6	44.0	35.6	28.1	70.4	91.8	111.3	71.4	76.4	116.9	79.0
Mar-13	76.5	35.1	36.9	81.6	92.6	97.7	30.5	32.1	46.3	62.0	53.8	58.2	44.1	34.8	28.8	72.8	89.4	112.0	71.9	73.1	123.3	78.8
Mar-14	78.1	35.8	40.1	79.1	87.1	103.7	32.8	31.8	44.6	61.6	59.5	60.4	44.6	35.6	28.7	74.7	89.8	111.3	71.0	67.7	121.8	79.0

HR: Haryana, HP: Himanchal Pradesh, J&M: Jammu & Kashmir, PB: Punjab, RJ: Rajasthan, DL: Delhi, BR: Bihar, JH: Jharkhand, OD: Odisha, WB: West Bengal, CH: Chhattisgarh, MP: Madhya Pradesh, UP: Uttar Pradesh, UT: Uttarakhand, GO: Goa, GJ: Gujarat, MH: Maharashtra, AP: Andhra Pradesh, KR: Karnataka, KE: Kerala, TN: Tamil Nadu, IND: All India