

Rating of State Co-operative Banks in India: A DEA Approach

Tarasankar Das

Associate Professor in Commerce
Fakir Chand College
e-mail: tsd_dh@rediffmail.com

Swagata Sen

Professor and Dean of Commerce
University of Calcutta
e-mail: swagata_sen_in@rediffmail.com

Abstract: Cooperative Bank plays an important role in meeting the growing credit needs of rural India. In the context of planned economic development, the state co-operative banks have become an important instrument in the hands of the State for rural development. The present study attempts to evaluate the performance of 31 State Co-operative Banks operating in India for the year 2011-12 by applying Data Envelopment Analysis (DEA) approach and finds out the relationship between the efficiency score of the banks and other independent variables by multiple regression analysis. The study observed that out of 31 State Co-operative Banks, 21 banks are efficient for the year 2011-12. The empirical findings suggest that in order to improve the efficiency of the State Co-operative Banks in India the inefficient banks have to reduce the amount of capital and number of employees. The findings suggest that technical efficiency of cooperative bank, which has been reflected by 'efficiency score', is positively associated with equity to total asset, bank size, ROA, non-interest income, and negatively related to market power, loans intensity, loan loss provisions to total liabilities, non-interested expenses to total asset.

Key-words: State co-operative bank, DEA, efficiency score, multiple regression, global leader.

1. Introduction

Economic development of a country or a state depends on the efficiency of its financial system. Cooperative banks have come to constitute an important segment of the financial system and occupy a unique position as they are organized on co-operative principles. A co-operative bank promotes economic activity and provides banking facilities and services to the weaker section of the society. The State co-operative bank is the leader of the co-operatives in a state and acts as a supervisory body at the top and arranges to spread the co-operative movement. The main objective of a State Co-operative Bank is to mobilize financial resources and make it available for provision of short and medium-term loans to agriculturists and small entrepreneurs through the mechanism of Central Co-operative banks at the district level and PACS at the village level in order to provide the banking facilities in the rural and remote area.

The rural and agricultural sector remained somewhat neglected and also the impact of reforms on the economic fortunes of the common people are overlooked. But our social goal

demands for development of the weak and poor. Due to liberalization, Government controls have been substantially reduced on domestic manufacturing, and trade and there have been significant reductions in regulations relating to foreign trade and investment. To encourage privatization, policies of the Government have been changed such as deregulation of state enterprises, reduction in tariff barriers, creation of proper environment for the development of private investment in infrastructure and manufacturing etc.

In this context, it would be worthwhile to analyse the possible impact of the New Economic Policy (NEP) on the co-operatives and to determine the roadmap for their survival. Till date, the New Economic Policy (NEP) has caused a lot of concern and apprehension among the co-operatives. As the economy is decontrolled and opened up, the number of operators in every field is increased. Cut-throat competition is observed in every sphere of the financial sector. The co-operatives are afraid that they would not be able to face this competition. The share of the co-operatives in agriculture, which used to be around 62% even in the year 1992-93, had slipped down to 16% in the year 2010-11 due to stiff competition with the commercial banks of public sector and private sector. In the light of the above discussion, the present study attempts to evaluate the performance of State co-operative Banks operating in India for the year 2011-12.

The remainder of the present study has been divided into five sections. Section 2 covers brief review of literature. Objectives of the study are covered in section 3. In section 4, methodology and data are discussed. Section 5 covers empirical results and in section 6 conclusion and suggestions are made.

2. Review of Literature

In the past, some studies relating to financial performance of commercial banks and co-operative banks in India and abroad have been conducted. A brief review of these efforts at research in this field has been presented in the following paragraphs.

Saha and Ravishankar (2000) has studied the performance of Indian banks using DEA approach. They suggested that DEA is a useful technique in determining relative efficiency. They also concluded that efficiency of public sector banks had improved during the study period.

Sathye (2003) has measured the productive efficiency of 94 Indian commercial banks for the year 1996-97. The efficiency has been calculated using Variable Return to Scale (VRS) input oriented model of the DEA methodology. The study shows that as per model A, the public sector banks have a higher mean efficiency score as compared to the private sector and foreign commercial banks in India. As per the model B, they have lower mean efficiency score than the foreign banks, but still higher than private sector commercial banks.

Nandy (2007) measured the comparative efficiency of public sector banks in India during 2005-06. The efficiency was calculated using variable return to scale (VRS), output oriented model of the DEA methodology. He concluded that out of 28 public sector banks operating

in India during the year 2005-06 , only 17 banks are 100% efficient, and to improve the overall efficiency of the public sector banks in India , the refereed banks have to increase their NP/TA by 41.4%, reduce number of branches by 17.14%.

Debnath and Shankar (2008) have tried to evaluate the efficiency of 50 Indian banks for the period 2004-05 by using DEA. They stated that among medium size banks, no nationalized banks were efficient, however small and large nationalized banks are more efficient and are doing better than medium sized nationalized banks.

Khankhoje and Sathye (2008) investigated whether restructuring of regional rural banks' in India—undertaken in 1993-94 has helped improve their production efficiency. The study finds that efficiency of rural banks has significantly improved after restructuring.

Cheng-Ruwu, Hui-Yin Tsai and Ya-Meiwang (2008) conducted a comparative analysis of efficiency of banks manageable in Hong Kong using two stage model, which evaluates their operational efficiency (OE), and profitability efficiency (PE). The study recommends that large banks are generally more efficient than small sized ones in the operational efficiency. They concluded that large banks' have better competitive power than those of smaller ones.

Kumar and Gulati (2010) analysed the trends of cost efficiency and its component across Indian Public Sector Banks (PSBs) during the post-deregulation period spanning from 1992-93 to 2007-08. Their investigation suggests that deregulation has had a positive impact on the performance of Indian public sector banking industry in terms of cost efficiency over the study period.

Mohindra and Kaur (2011) attempted to empirically examine the relative efficiency of regional rural banks in India during the post reform period from 1991-92 to 2006-07 by using non-parametric technique of Data Envelopment Analysis (DEA). The empirical findings provided the evidence of positive relationship among scale economies and bank size.

Sekhri and Varshney (2011) attempted to measure the technical efficiency (TE), based on cross section data of 69 banks in India during the period 2007-08 and 2008-09. They concluded, with the help of efficiency profitability matrix, out of 69 banks covered under the study five public sector banks, two private sector banks and two foreign banks are able to maintain their star status for both years. These nine banks appear as ideal banks and a benchmark for other banks.

Thagunna and Poudel (2013) sought to measure and analyze the efficiency levels of banks in Nepal during 2007-08 to 2010-11. The study reveals that efficiency level is relatively stable and has increased on overall. The study also found that both the ownership type and the asset size of a bank don't affect its efficiency.

Jayaraman and Srinivasan (2014) attempted to measure the efficiency index for the banks in India using DEA models (cost, revenue and profit DEA models) and Shannon entropy method. The study suggested that Shannon-DEA approach provides a comprehensive efficiency index for banks as well as a reasonable way of ranking the banks.

Sravani (2014) tried to estimate technical efficiency of public sector banks in India for the period 2009-2013. From the study it was observed that the overall average technical efficiency of selected public sector banks for the period 2009 to 2013 was found to be 91.64% under CRS assumption and 95.45% under VRS assumption.

From the above literature review, it is apparent that till date no organized and systematic study has been done on the performance of State Co-operative Banks in India. This paper attempts to provide an analytical study which would highlight the performance of 31 State Co-operative banks operating in India and also suggest measures for overcoming the weaknesses and deficiencies.

3. Objectives of the Study

The present study aims to evaluate the performance of the State Co-operative Banks operating in India. Specifically, the objectives are to:

- i) measure the efficiency score of each State Co-operative Banks operating in India for the year 2011-12;
- ii) analyse the efficiency report (input and output) of each State Co-operative Bank in India for the year 2011-12;
- iii) identify the potential improvement of the inefficient State Co-operative Banks during the year 2011-12 and
- iv) find out the relationship between the efficiency score and other independent variables of the banks.

4. Methodology and Data

The methodology is presented under the following major heads:

- a) Institutions covered under this study–

The present study covers the performances of 31 State Co-operative Banks operating in India.

- b) Period of study– The present study covers the period 2011-12.

- c) Nature and sources of data–

Secondary data have been used in the present study. The secondary data are collected from the various issues of report on basic data on performance of State co-operative banks in India published by National Federation of State Co-operative Bank Ltd. (NAFSCOB), annual reports published by National Bank for Agricultural and Rural Development (NABARD) and various issues of Report on Trends and Progress on Banks in India published by Reserve Bank of India (RBI).

- a) Analytical techniques applied–

- 1) Data Envelopment Analysis (DEA):

Data Envelopment Analysis (DEA) is a linear programming technique for the measurement of relative efficiency score of the various Decision Making Units (DMUs) in a particular sample. With the help of DEA, each DMU is assigned a single efficiency score, hence allowing ranking amongst the DMUs in the sample. The best performing DMU is assigned an efficiency score of unity (1) and the efficiency score of other decision making units ranges between 0 and 1. For the in-efficient DMUs, DEA measures the slacks in each of the input and output variable and also derive a reference group of efficient units with which they can directly compare. This set of efficient DMUs is called reference set. The owners of the DMUs may be interested to know which DMU frequently appears in this set. A DMU that appears more than others in this set is called the global leader. The value of lambda determines the most influencing referent bank. The higher the value of lambda means that stronger the referent bank.

In the present study, the efficiency has been calculated using variable returns to scale (VRS) input oriented model. The input oriented BCC model for the DMU_j can be written as:

$$\text{Min } Z_0 = \theta_0$$

$$\text{Subject to } \sum_{j=1}^n \lambda_j y_{rj} \geq y_{r0} \quad r = 1, 2, 3, \dots, s$$

$$\theta_0 x_{i0} \geq \sum_{j=1}^n \lambda_j x_{ij} \quad i = 1, 2, 3, \dots, n$$

$$\sum_{j=1}^n \lambda_j = 1$$

$$\lambda_j \geq 0 \quad j = 1, 2, 3, \dots, n$$

y_{rj} and x_{ij} respectively denote the r th output and i th input for the j th bank. Where the technical efficiency of DMU _{j} is denoted by θ_0 and λ_j indicates weight of the j th DMU. The BCC efficiency scores are obtained by running the above model for each DMU. These scores are called "Pure technical score", since they are obtained from the model which considers the variable return to scale. Once "Pure technical efficiency", estimates are available, scale efficiency (SE) is computed from the formula, SE = Technical efficiency (CRS)/Pure technical efficiency (VRS). The DMU with technical efficiency $\theta_j < 1$ is considered as inefficient, the efficiency $\theta_j = 1$ shows the efficient DMU placed on the efficiency frontier. Four inputs and three output variables namely, capital, deposits, borrowings, number of employees (inputs) and loans and advances, investments and per employee business (outputs) have been used in this study.

2) Multiple Regression Analysis:

Linear multiple regression analysis is a sophisticated statistical technique to search the influence of one variable to another variable. In other words, it is a refined statistical technique to explore the relationship between three or more variables. In the present study, it is applied to enlighten

the effect of explanatory variables—Equity to total asset (Equita), Loan loss provisions to total loans (Llptl), Log of total deposits (Lndepo), Log of total asset (Lnta), Loans to total asset (Loansta), Non-interest expenses to total asset (Nieta), Non-interest income to total asset (Niita) and Return on asset (Roa) on the dependent variable efficiency score (ES) derived from the Data Envelopment Analysis (DEA) using variable return to scale input oriented model. For analytical analysis, the regression model is specified as:

$$E_s = \beta_0 + \beta_1 (\text{Equita}) + \beta_2 (\text{Llptl}) + \beta_3 (\text{Lndepo}) + \beta_4 (\text{Lnta}) + \beta_5 (\text{Loansta}) + \beta_6 (\text{Nieta}) + \beta_7 (\text{Niita}) + \beta_8 (\text{Roa}) + \text{eit}$$

E_s = Efficiency score, β_0 is constant and β_i are the regression coefficients of the explanatory variables, while *eit* is the residual error of regression.

5. Empirical Results

Table-1 presents the efficiency summary of 31 State Co-operative banks operating in India for the year 2011-12. As per the table, 26 State Co-operative Banks (StCBs) are efficient, each of which has efficiency scores of 1 (100% efficiency), whereas the rest of the banks are inefficient, whose scores are less than 1. From the table it may be observed that Bihar State Co-operative Bank is the most inefficient bank for the year 2011-12 which scores only 0.541. From the table 1, it may be observed that Sikkim State Co-operative Bank has maximum reference set frequency 4, that indicate this bank referred four times while measuring the efficiency of inefficient State Co-operative banks. Sikkim State Co-operative bank is considered as 'Global Leader' as the bank appears more than the other banks for the year 2011-12. When the reference set frequencies of DMUs are 0 that indicate the banks are not at all referred in measuring the efficiencies of inefficient banks. Returns to Scale (RTS) as identified by the input oriented BCC model is also presented in table 1. The bank has the scale efficiency when it operates in the range of constant returns to scale. From the table 1 it may be observed that the share of scale efficient banks i.e. operating at CRS in the year 2011-12 is 80.65%. The share of banks experiencing economies of scale i.e. operating at IRS during the said period are 6.45%. The share of banks witnessing diseconomies of scale i.e. operating at DRS is 12.90%.

Table-1: Efficiency Summary of State Co-operative Banks in India for the year 2011-12

Sl. No	Name of the SCB	Efficiency summary			Return to Scale	Rank	Reference set Frequencies
		Crste	Vrste	Se			
1	Andaman & Nicobar	1	1	1	CRS	1	0
2	Andhra Pradesh	0.955	1	0.955	DRS	1	0
3	Arunachal Pradesh	1	1	1	CRS	1	2
4	Assam	1	1	1	CRS	1	0
5	Bihar	0.54	0.541	0.988	DRS	6	0

**Table-1 : Efficiency Summary of State Co-operative Banks in India
for the year 2011-12 (Contd.)**

Sl. No	Name of the SCB	Efficiency summary			Return to Scale	Rank	Reference set Frequencies
		Crste	Vrste	Se			
6	Chandigarh	1	1	1	CRS	1	1
7	Chhattishgarh	1	1	1	CRS	1	0
8	Delhi	1	1	1	CRS	1	1
9	Goa	1	1	1	CRS	1	0
10	Gujarat	1	1	1	CRS	1	2
11	Haryana	0.969	0.97	1	CRS	2	0
12	Himachal Pradesh	1	1	1	CRS	1	0
13	Jammu & Kashmir	1	1	1	CRS	1	0
14	Karnataka	0.967	0.968	0.999	IRS	3	0
15	Kerala	0.984	1	0.984	DRS	1	0
16	Madhya Pradesh	0.949	0.956	0.993	DRS	4	0
17	Maharashtra	1	1	1	CRS	1	1
18	Manipur	1	1	1	CRS	1	0
19	Meghalaya	1	1	1	CRS	1	0
20	Mizoram	1	1	1	CRS	1	0
21	Nagaland	0.822	0.859	0.957	IRS	5	0
22	Orissa	1	1	1	CRS	1	0
23	Pondicherry	1	1	1	CRS	1	0
24	Punjab	1	1	1	CRS	1	3
25	Rajasthan	1	1	1	CRS	1	1
26	Sikkim	1	1	1	CRS	1	4
27	Tamilnadu	1	1	1	CRS	1	1
28	Tripura	1	1	1	CRS	1	0
29	Uttar Pradesh	1	1	1	CRS	1	1
30	Uttarakhand	1	1	1	CRS	1	1
31	West Bengal	1	1	1	CRS	1	0

Note: Crste = technical efficiency from CRS DEA

Vrste = technical efficiency from VRS DEA

Se = scale efficiency = crste/vrste

Tarasankar Das and Swagata Sen

Table-2 shows the efficiency report (input) of 31 State Co-operative Banks operating in India. It may be observed from the said table that the banks having 100% efficiency (TE=1) have no scope for any further improvement and in that case observed value and projected value are equal. But in the case of banks having scored less than 1, there is scope for further improvement. Potential improvement in the case of inefficient banks should be negative meaning that the said banks should reduce the inputs in order to reach 100% efficiency. As our study assumed to input oriented DEA, so all of the four inputs have a scope for further potential improvement in the case of inefficient banks. For instance, Bihar state co-operative bank (TE=0.54) has the scope to reduce the capital by Rs. 899 crores, deposits by Rs. 85570 crore, borrowings by Rs 38517 crores and number of employees by 79 to become 100% efficient.

Table-2 : Efficiency Report (input) of 31 STCBs during 2011-12

Sl No	Name of the STCBs	TE	Capital			Deposits			Borrowings			No. of Employees		
			OV	PV	PI	OV	PV	PI	OV	PV	PI	OV	PV	PI
1.	Andaman & Nicobar	1	294	294	0	45603	45603	0	4591	4591	0	234	234	0
2.	Andhra Pradesh	1	24659	24659	0	391190	391190	0	508629	508629	0	558	558	0
3.	Arunachal Pradesh	1	19236	19236	0	9508	9508	0	14934	14934	0	318	318	0
4.	Assam	1	884	884	0	155947	155947	0	700	700	0	670	670	0
5.	Bihar	0.54	1959	1060	-899	186608	101038	-85570	78221	39704	-38517	169	90	-79
6.	Chandigarh	1	61	61	0	25444	25444	0	0	0	0	76	76	0
7.	Chhattisgarh	1	7705	7705	0	148358	148358	0	70216	70216	0	122	122	0
8.	Delhi	1	708	708	0	77586	77586	0	2146	2146	0	566	566	0
9.	Goa	1	2062	2062	0	116027	116027	0	0	0	0	682	682	0
10.	Gujarat	1	2062	2062	0	486157	486157	0	242329	242329	0	197	197	0
11.	Haryana	0.97	10474	5762	-4712	213090	206605	-6485	340441	330080	-10361	469	395	-74
12.	Himachal Pradesh	1	843	843	0	524219	524219	0	74927	74927	0	1210	1210	0
13.	Jammu & Kashmir	1	152	152	0	49022	49022	0	78	78	0	178	178	0
14.	Karnataka	0.96	11331	6809	-4522	526349	509517	-16832	283431	274367	-9064	419	405	-14
15.	Kerala	1	38869	38869	0	590416	590416	0	138432	138432	0	282	282	0
16.	Madhya Pradesh	0.95	21203	14584	-6619	387879	370638	-17241	334682	319805	-14877	664	512	-152
17.	Maharashtra	1	44465	44465	0	1586239	1586239	0	396571	396571	0	1728	1728	0
18.	Manipur	1	1521	1521	0	9457	9457	0	12067	12067	0	84	84	0
19.	Meghalaya	1	469	469	0	115744	115744	0	4425	4425	0	595	595	0
20.	Mizoram	1	604	604	0	37223	37223	0	2969	2969	0	142	142	0
21.	Nagaland	0.85	3550	1248	-2302	36684	31500	-5184	1028	882	-146	229	156	-73
22.	Orissa	1	17067	17067	0	395428	395428	0	340316	340316	0	215	215	0
23.	Pondicherry	1	1458	1458	0	53262	53262	0	1917	1917	0	265	265	0
24.	Punjab	1	6768	6768	0	259339	259339	0	482272	482272	0	462	462	0
25.	Rajasthan	1	8421	8421	0	358002	358002	0	361059	361059	0	274	274	0
26.	Sikkim	1	1128	1128	0	13600	13600	0	391	391	0	48	48	0
27.	Tamilnadu	1	10670	10670	0	662009	662009	0	223340	223340	0	556	556	0
28.	Tripura	1	1719	1719	0	115555	115555	0	281	281	0	256	256	0
29.	Uttar Pradesh	1	14385	14385	0	463072	463072	0	180350	180350	0	1132	1132	0
30.	Uttarakhand	1	3391	3391	0	123123	123123	0	51128	51128	0	79	79	0
31.	West Bengal	1	3589	3589	0	503156	503156	0	119491	119491	0	409	409	0

Efficiency report (output) of 31 State Co-operative Banks for the year 2011-12 is presented in table 3. As our study adopted on input oriented DEA, there may not be any scope for further improvement for some of the outputs of the inefficient banks. In the case of output, potential improvement should be positive meaning that the inefficient banks should increase output to become efficient As it is evident from table 3 that Bihar State Co-operative Bank has ample scope for further improvement in loans and advances, and investments but not the per employee business (PEB).

Table-3 : Efficiency Report (output) of 31 STCBs during 2011-12

Sl No	Name of the STCBs	TE	Loans and Advances			Investments			PEB		
			OV	PV	PI	OV	PV	PI	OV	PV	PI
1	Andaman & Nicobar	1	22282	22282	0	31540	31540	0	290	290	0
2	Andhrapradesh	1	707808	707808	0	137653	137653	0	1969	1969	0
3	Arunachal Pradesh	1	10944	10944	0	27285	27285	0	64	64	0
4	Assam	1	50484	50484	0	101956	101956	0	308	308	0
5	Bihar	0.54	35905	60625	24720	37311	70978	33667	1316	1316	0
6	Chandigarh	1	6201	6201	0	6449	6449	0	416	416	0
7	Chhattishgarh	1	115553	115553	0	42815	42815	0	2163	2163	0
8	Delhi	1	38563	38563	0	62537	62537	0	205	205	0
9	Goa	1	62439	62439	0	34772	34772	0	261	261	0
10	Gujrat	1	362408	362408	0	363232	363232	0	4307	4307	0
11	Haryana	0.97	451534	451534	0	72254	110127	37873	1417	1455	38
12	Himachal Pradesh	1	222649	222649	0	393094	393094	0	617	617	0
13	Jammu& Kashmir	1	10060	10060	0	37979	37979	0	332	332	0
14	Karnataka	0.96	538150	538150	0	189817	246073	56256	2540	2885	345
15	Kerala	1	307671	307671	0	189566	189566	0	3184	3184	0
16	Madhya Pradesh	0.95	452907	452907	0	288117	288117	0	1266	1645	379
17	Maharashtra	1	1028528	1028528	0	1176550	1176550	0	1513	1513	0
18	Manipur	1	15248	15248	0	10322	10322	0	294	294	0
19	Meghalaya	1	42112	42112	0	47239	47239	0	265	265	0
20	Mizoram	1	21597	21597	0	10629	10629	0	414	414	0
21	Nagaland	0.85	13209	13209	0	23569	23569	0	218	391	173
22	Orissa	1	379279	379279	0	388944	388944	0	3603	3603	0
23	Pondicherry	1	38734	38734	0	17026	17026	0	347	347	0
24	Punjab	1	629567	629567	0	148764	148764	0	1924	1924	0
25	Rajasthan	1	403592	403592	0	349059	349059	0	2779	2779	0
26	Sikkim	1	9264	9264	0	7663	7663	0	476	476	0
27	Tamilnadu	1	658300	658300	0	213899	213899	0	2375	2375	0
28	Tripura	1	35637	35637	0	76065	76065	0	590	590	0
29	Uttar Pradesh	1	497948	497948	0	145574	145574	0	849	849	0
30	Uttarakhand	1	64314	64314	0	108008	108008	0	2373	2373	0
31	West Bengal	1	330300	330300	0	285618	285618	0	2037	2037	0

Tarasankar Das and Swagata Sen

Potential improvement (%) and reference sets schedule of the inefficient State Co-operative Banks in India for the year 2011-12 are presented in table 4. For example, it may be observed from the table that Bihar State co-operative Bank having efficiency score of 54% may reduce its input utilization as capital by 45.89%, deposits by 45.85%, borrowings by 49.24%, number of employees by 46.74% and can improve its output level as loans and advances by 68.84% and investment by 90.23%. Potential improvement of input and output of 5 inefficient banks are presented in this table. The value of lamda determines the most influencing referent bank. The higher the value of lamda means that stronger the referent bank. For instance the peer groups for Bihar State Co-operative Banks are Chandigarh State Co-operative Bank with a lamda value 0.654, Gujarat State Co-operative Bank with lamda equal to 0.115, and finally Uttarakhand State Co-operative Bank with lamda value 0.231. This result implies that Bihar State Co-operative bank being an inefficient bank ranking 6 with efficiency score of only 54% becomes 100% efficient if Chandigarh State Co-operative Bank is chosen as a role model. Similarly the other reference set of the inefficient banks can be interpreted.

Table-4: Potential improvement (%) and Reference Sets Schedule of the Inefficient STSBs for the year 2011-12

Sl. No	In efficient STCBs	Efficiency Score (%)	INPUTS				OUTPUTS			Reference set (Lamda)
			Capital	Deposits	Borrowings	No. of employees	Loans & Adv.	Investment	PEB	
1	Bihar	0.54	-45.89	-45.85	-49.24	-46.74	68.84	90.23	0	Chandigarh (0.654) Gujrat (0.115) Uttarakhand (0.231)
2	Haryana	0.97	-44.09	-3.04	-3.04	-15.77	0	53.8	2.68	Sikkim (0.272) Punjab (0.658) Uttar Pradesh (0.070)
3	Karnataka	0.96	-39.9	-3.19	-3.19	-3.34	0	29.63	13.58	Gujrat (0.334) Tamilnadu (0.448) Punjab (0.194) Sikkim (0.024)
4	Madhya Pradesh	0.95	-31.21	-4.44	-4.44	-22.89	0	0	29.93	Rajasthan (0.281) Arunachal Pradesh (0.254) Maharashtra (0.111) Punjab (0.354)
5	Nagaland	0.85	-64.84	-14.13	-14.2	-31.87	0	0	79.35	Arunachal Pradesh (0.025) Sikkim (0.568) Delhi (0.126) Jammu& Kashmir (0.281)

efficient if Chandigarh State Co-operative Bank is chosen as a role model. Similarly the other reference set of the inefficient banks can be interpreted.

Multiple correlation and multiple regression analysis of State Co-operative Banks in India have been shown in table 5. The strengths of the relationship between the dependent variable—efficiency score (ES), and all the independent variables taken together considered in this study and the impact of the independent variables on the efficiency score (ES) are shown in table 5 after considering regression analysis under enter method.

Table-5 : Results of Determinants of Efficiency Score of State Co-operative Banks of India

	Coefficient	Std. Error	t-Statistic	Prob.	VIF
ES	-5.96	5.63	-1.05	0.4823	.
Equita	13.59	13.04	1.04	0.4868	1.932
Llptl	-7.89	8.89	-0.88	0.5377	1.894
Lndepo	-2.47	5.44	-0.45	0.729	2.001
Lnta	3.99	5.63	0.70	0.6076	1.762
Loansta	-3.87	4.48	-0.86	0.5461	1.599
Nieta	-62.55	51.51	-1.21	0.4385	1.438
Niita	56.97	59.29	0.96	0.5127	1.847
Roa	72.67	63.57	1.14	0.4575	1.133
R=0.89 R-squared = 0.80		Adjusted R-squared = 0.78			
S.E. of regression=0.057418		Prob (F-statistic) = 0.80			
Durbin-Watson stat= 1.4507					

VIF statistic is more than 1 and near about 2 indicates that there is no multicollinearity problem. At the same time, Durbin-Watson statistic (1.4507) indicate that errors terms are not auto correlated. It is observed from table 5 that an increase in equity to total asset (Equita) by one unit, the efficiency score (ES) of the banks increase by 13.59 unit. So Equita has a positive relationship with efficiency score. As per our expectation Llptl shows a negative relationship with the efficiency score. When Loan loss provisions to total loans (Llptl) increase by one unit, the efficiency score (ES) of the banks decrease by 7.89 units. The results imply that State co-operative banks in India should give proper attention in credit risk management. Lndepo which is the proxy of market power reveals a negative relationship with the efficiency score. When Log of total deposits (Lndepo) increase by one unit, the efficiency score of the banks decrease by 2.47 units. So, it is observed that if the bank expanding their market share which involves extra costs and input adversely affects the efficiency score of the banks. As a proxy of bank's size, Lnta has the positive relationship with efficiency score which indicates that

efficient bank gets the benefit of economies of scale. We observed that when Log of total asset (Lnta) increase by one unit, the efficiency score of the banks increase by 3.99 unit. When Loans to total asset (Loansta) is increased by one unit, the efficiency score of the banks decreased by 3.87 units and it is also insignificant at 5% level of significance. The empirical findings suggest that the banks having higher loan to asset ratio produces the lower efficiency score. As expected it is also observed that quality of management as measured by Non-interest expenses to total asset (Nieta) has the negative relationship with the efficiency score. When Nieta has increased by one unit, the efficiency score of the banks is decreased by 62.55 unit. As a proxy of diversification of activities of banks into non-traditional activities, non-interest income to total asset (Niita) has the strong and positive relationship with the efficiency score of the banks. When Non-interest income to total asset (Niita) increase by one unit, the efficiency score of the banks increase by 56.97 units. The study observed that profitability of the banks which is commonly measured by the ROA has positive relationship to efficiency score of the banks. It is observed from the table that efficiency score of the banks have been increased by 72.67 units if Return on Asset (ROA) is increased by one unit. We may say that more profitable banks tend to have high efficiency score. The multiple correlation co-efficient between the dependent variable efficiency score (ES) and the independent variables taken together are (R) 0.89. It indicates that the efficiency score is highly responded by its independent variables. It is also evident from the value of R² that 80% of the variation in efficiency score is accounted by the joint variation in independent variables. Adjusted R² signifies that 78% of the variations in the efficiency score are explained by the independent variables. Standard error of regression co-efficient being low certifies that there exists really line of estimates among the variables. The value of F=0.80, which examines the significance of all the variables collectively in regression function. The observed R² and F statistics may thus be sufficient to draw an inference in favour of the goodness of the regression model to fit into the present bank of identifying the factors influencing the efficiency score of the banks during the study period.

Then the research (dependent) variable depends certain percentage on unexplained variables that may shock the research variables, which are, fund management and resource allocation by the bank, cost control management and policy adopted by bank management as internal omitted factors and prudential norms-asset classification, capital adequacy, income recognition and provisioning norms, agricultural credit contributed by NABARD, Government investment in the agricultural sector, regulations in interest rate, policy of the market economy in the post-LPG era and political, economic, social and technological factors as external omitted factors.

6. Conclusion and Suggestions

Using published data, this paper worked out the efficiency score of 31 State Co-operative Banks for the year 2011-12. The scores are calculated using Data Envelopment Analysis (DEA). DEA highlights the areas of improvement (input and output) for each inefficient unit. The study shows that out of 31 State Co-operative Banks operating in India during the year 2011-12, 21 banks

are efficient. The result shows that the share of scale efficient banks i.e. operating at CRS in the year 2011-12 is 80.65%. The share of banks witnessing diseconomies of scale i.e. operating at DRS is 12.90%. It implies that there is excess in input and a shortage of output. The study recommends the optimum utilization of existing inputs for improving the efficiency of inefficient units. Bihar State Co-operative Bank is the most inefficient bank for the year 2011-12 with 54% efficiency score. Sikkim State Co-operative Bank has maximum reference set frequency, is considered as 'Global Leader' for the year 2011-12. The empirical findings suggest that in order to improve the efficiency of the state co-operative Banks in India the inefficient banks have to reduce the amount of capital and number of employees. The findings suggest that technical efficiency is positively associated with equity to total asset, which indicate that efficiency scores are influenced by the capital base of the banks. The study also shows that efficiency score is positively associated with bank size, suggesting that larger banks tend to be more efficient. ROA is the profitability measure of banks and it is positively associated with efficiency score indicating that the more efficient banks are more profitable. Non-interest income to total asset is positively associated with the efficiency score indicating that the efficient banks tend to become more managerially efficient as they increase their income from non-interest sources. The findings also suggest that the efficiency of banks is negatively related to market power (Lndepo) which indicate that more efficient bank has the lower market share. Loans intensity (Loansta) reveals a negative relationship with efficiency score which implies that banks with higher loans to asset ratio have a chance of lower efficiency score of the banks. Loan loss provisions to total liabilities (Llptl) shows a negative relationship with efficiency score which indicate a bank having bad loans reduce the profitability and efficiency. Non-interested expenses to total asset (Nieta) have negative impact on efficiency score. It may be suggested that a high non-interest expenses to total asset ratio affected the performance of bank negatively and efficient banks are to operate at lower cost.

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