COMPOSITE NON-PARAMERTRIC CSR INDEX FOR PUBLIC SECTOR BANKS OF INDIA

Vipul Gupta

Ph.D Scholar, Department of Economics, Panjab University, Chandigarh,   india.

Abstract:

This paper provides a methodological framework for developing a non-parametric corporate social responsibility (CSR) index for India's public sector banks. The index is made up of four dimensional indices that capture various CSR indicators. A modified version of data envelopment analysis (DEA), also known as the Benefits-of-the-Doubt model, is used for the aggregation. To construct the composite index of CSR, this method is special in that it does not include a-priori information of weights and instead assigns endogenous weights obtained from actual data to each individual dimension of CSR by banks. This methodological framework was demonstrated using a data set of 26 Public Sector Banks that began CSR operations in 2008 in response to RBI directives issued in 2007 and continued until 2017, when SBI Associates merged in SBI. The information was gathered using the Reserve Bank of India's (RBI) 48 CSR indicators as well as the Companies Act of 2013. The results depicted that since 2007, PSBs have followed a CSR pattern, according to the report.

1. Introduction:

In the recent years, academics, policymakers and banking institutions have become more interested in Corporate Social Responsibility (CSR). Banks and financial institutions began invest in environmentally sustainable and socially responsible lending procedures. On December 20, 2007, the Reserve Bank of India (RBI) directed commercial banks to conduct non-financial reporting and invest in CSR initiatives that include environmental, social, and economic perspectives (Reserve Bank of India). All schedule commercial banks in India were directed to integrate their business activities with environmental and social concerns. The Companies Act of 1956 was revised in 2013 and again in 2014, requiring businesses including banks to devote 2% of their profits to CSR operations. In this sense, the CSR index is a critical tool that benefits banks, stakeholders, and society.

Public sector banks (PSBs) are said to be suffering from the panacea of nonperforming assets

(NPAs) and poor governance (Heremans, 2007). Any laxity on the part of banks in terms of social responsibility increases the prospect of a penalty under the Companies Amendment Act of 2019. In this light, a CSR index is useful to bank stakeholders. The index indicates how well banks adhere to social and environmental issues. The set of social responsibility indicators that were established among specific dimensions of CSR such as environmental issues, human resources, community engagement, social goods, and service quality (Gray et al., 1995 and Kaushal 2018) are abbreviated into a single numerical value that is easier to interpret and an effective tool for policy analysis by a composite index of CSR. Furthermore, the CSR index adjustments show regulators how the social responsibility concept is working for banks.

As a result, the aim of this paper is to demonstrate how a data envelopment analysis (DEA)-based benefits-of-doubt (BoD) methodology can be used to create a composite index of CSR for PSBs using a variety of qualitative norms. The paper shows how to use endogenous and idiosyncratic weights to combine dimensional indices to capture various dimensions of CSR. (i) Environmental concerns, (ii) Human Capital, (iii) Community Engagement, and (iv) Social Goods and Service Quality are among the dimensions considered for this report. An example is also given to demonstrate how the CSR index for 26 PSBs was constructed using data from the 48 social responsibility norms.

To the best of the author's knowledge, this is the first study that suggests the use of a benefits-of-doubt approach to create a CSR index for PSBs. This is the first research to use a linear programming method to achieve a robust measure of the CSR index using data-driven endogenous weights. Previous research on the topic of CSR index construction is minimal and in its early stages. As a result, this research adds to the sparse literature on the topic. Earlier research attempted to construct the CSR index primarily by conventional methods, such as the simple linear unweighted average method (see Bellu and Manescu, 2013; El-Masry and Kamal, 2013; Maqbool and Zameer, 2018). Because of its attractive properties and merits, the literature on the construction of composite indexes describes BoD as the most suitable and relevant method. The benefits of the BoD approach are as follows: I it allows the actual data to decide on weights (OECD 2008), ii) it assigns a single numerical score to a range of dimensions (Rogge and Puyenbroeck 2007; Puyenbroeck 2018), iii) it is appropriate for small samples, iv) it is independent of a priori statistical assumptions and appropriate to aggregate unit invariant data, and v) it allows endogenously calculated (Zhou et al. 2007; Greco et al. 2018).

BoD has been used to construct composite indexes in a variety of fields due to its properties and advantages. Despotis (2005) used it to create a Human Development Index, while Cherchye et al. created a Robust Human Development Index. Murias et al. (2006) created an Economic Wellbeing Index, Zhou et al. (2007) calculated a Sustainable Energy Index, Hermans et al. (2008) created a Road-safety Index, Antonio and Martin (2012) created a Child Health Index, and Badasyan et al. (2011) created a Child

In the following parts, section 2 discusses the review of literature; section 3 describes the data and methodology divided into two sections. Section 3.1 details the data envelopment analysis (DEA) based benefit-of-the-doubt model based on the derivation of composite index of CSR for Banks with qualitative and regulatory norms and Section 3.2illustrates the creation of a corporate social responsibility index for India's public sector banks. In section 4, the construction of CSR dimensional indices and their aggregation to form constrained BOD based CSR indices is defined. The inference is drawn from the construction of an index in the final section.

2. Literature Review:

CSR in banks is gaining traction in developing countries such as India, and researchers have long advocated for research in this field (see Simpsons and Kochers, 2002; Narwal, 2007). Consumers,

investors, civil society, and the government have all placed significant pressure on banks to comply with CSR, non-financial reporting, and sustainable growth. However, following the RBI's guided guidelines in December 2007, as well as the Companies Amendment Act of 2013, researchers became increasingly interested in this area (see Dhingra and Mittal, 2014, Sharma, 2016). Despite the fact that there is a large body of literature on computing the qualitative aspects of CSR in banking (Hossain,2007; Narwal,2007; Bosque et al.,2012; Palmer,2012; Vijay & Divya,2014; I.B.et al.,2016, Maqbool and Zameer,2019), quantification of CSR is restricted. CSR practices by banks are thought to be a strategy for building prestige, credibility, and a competitive advantage. An optimal CSR initiative for stakeholders improves productivity and lowers costs, resulting in increased benefit efficiency. Satisfied workers' pay banks through constructive activities and lower recruitment costs; satisfied clients through repeat deposits; satisfied investors who lend money at a high rate result in lower capital costs; satisfied communities minimize advertisement costs; and environmental stewardship improves favorable circumstances. As banks improve their CSR towards stakeholders, customers not only admire but also become more engaged with the bank. Customers became brand diplomats with loyalty durability because of this strong and persistent identification (Sen& Bhattacharya, 2001, Gillentine, 2006). CSR programs would provide banks with a competitive advantage (Porter &Kramer, 2002). In conclusion, CSR can be related to a variety of financial benefits (Maqbool and Zameer, 2019). Previous research on bank CSR programs looked at how they affected their financial results. Some researchers concentrated on the structure and character of CSR in India (Arora&Puranik, 2004; Singh, 2010; Sood&Arora, 2006), while others examined the activities and policies of CSR in India (Khan & Atkinson, 1987; Jain &Kaur, 2004; Narwal, 2007). (Arora&Rana, 2010; Gupta &Saxena, 2006). As a result, the construction of a weighted CSR index is constrained.

Two central issues in the construction of the composite index for CSR for banking firms are revealed by the literature. These concerns include (i) the dimensions used to create the composite index, and (ii) the methodological index used to aggregate the dimensions. The majority of the researchers calculated the CSR index by assigning them a score of 0 and 1. When a bank conducts a CSR activity, it is given a score of one and a score of zero, and then an unweighted average is determined (see Sharma,2016; Maqbool and Zameer,2019), with the dimensions dependent on one or two sets of theory dimensions such as environmental concern.

A closer examination of the literature on the CSR index shows that, first and foremost, most studies focused on one or a few dimensions for a detailed index and did not consider the mechanism of such an index. Second, the studies used a conventional unweighted approach to create the CSR index, implying that all weights are equal, despite the fact that not all social responsibility dimensions which have equal weights. Thus, our research aims to address the aforementioned issues in the literature by presenting a comprehensive method for calculating CSR for public sector banks using endogenously generated weights and a non-parametric methodological framework.

3. Data and Methodology:

3.1 A constrained "Benefit-of-the-doubt" model focused on data envelopment analysis (DEA).

The use of a constrained BoD model to create a CSR index for Public Sector Banks is highlighted in this section. Charnes, Cooper, and Rhodes (1978) built the DEA model on Frrells' (1957) seminal work to determine the relative efficiencies of decision making units (DMUs) in a non-parametric system with multiple inputs and outputs. Several extensions and theoretical contributions to DEA modeling have been made in recent years. One of the most prominent contributions and extensions is the class of "Benefit-of-the-doubt" model, which predicts the optimized endogenous weights to sum up the different dimensions of results. Melyn and Mosen (1991) proposed the BoD method, which was later established by Cherchye et al (2004, 2007). Where the exact weights are not specified apriori, the Bod approach is similar to the DEA approach, which precisely sums up indicators and draws a single composite index (Cherchye et al. 2007). In

the BoD model, the composite index is generated by examining all of the indicators as outputs, with no inputs taken into account (Lovell et al. 1995). In practice, the Bod compares actual performance to benchmark performance, excluding external performance that cannot be determined in the relevant local context (Giambona and Vassallo, 2013). In fact, in the absence of true weights, Bod assigns the data-driven benefits-of-doubt weights to each indicator, resulting in the creation of a composite score for each unit (Witte and Rogge, 2011).

The restricted benefit-of-the-doubt model, which is an extension of the basic BoD model, is used to analyze data from the Public Sector Bank. The constrained BoD model is a bank-specific model that must be solved separately for each bank in order for variable weights to be produced endogenously across banks for various dimensions. The BoD model's main goal for a traditional bank is to increase weights such that the bank's corporate social success is as high as possible. The Bod assigns weights to indicators in dimensions of corporate social responsibility where a bank performs better than other banks in the data to optimize the impact of the indicators. Thus, the BoD model's endogenous idiosyncratic weights produce the full value of the composite index of social responsibility and are ideal.

The basic BoD model is formulated with the assumption that n =1,…..,m means banks, I =1,…..,n means CSR dimensions, S and T means endogenous weights viz. $0 \leq T_{ln} \leq 1$ and $\sum_{l=1}^{n} T_{ln} = 1$. The linear programming formulation of the BoD model looks similar as DEA model in the multiplier form as:

$$CSR_o = \max_{T_{n,o}} \sum_{l=1}^{n} Ts_{lo} \qquad (A)$$

Subject to

$$\sum_{l=1}^{n} Ts_{lo} \leq 1 \qquad n = 1,…..,m$$
$$T_{lo} \geq 0 \qquad l = 1,……, v$$

The observed values of the composite index of CSR for Bank o in terms of all dimensions selected are represented by the optimal solution of model (A). There are a few things that must be inferred here: (i) CSRo range from 0 to 1, with 0 indicating the worst performer and 1 indicating the best performer among the selected banks. (ii) The chosen model was solved n times for each bank in the study, yielding a set of composite indices CSR1, CSR2...........CSRn for n banks. (iii) T_{lo} are non-negative endogenous weights that are bank unique. (iv) The weights in the chosen model are assigned in such a way that they optimize the significance of the selected bank's composite measures, demonstrating that any other weighing scheme would worsen the bank's ranking. (v)The weights are allocated in such a way that the resultant would not be greater than one if they are assigned to some other bank in the study (Thanassoulis et al. 2016). (vi) During the construction of CSRo, the bank "o" in the sample was given the highest possible score compared to any other bank in the sample, demonstrating that a bank's good or bad position is not based on a good or bad weighing scheme since the weights were allocated to achieve the best possible results for each bank (Giambona and Vassallo 2013). (vii) The chosen model does not take subjectivity into account when assigning weights, and weights allocated based on an objective score for each bank in the study (2007, Zhou et al.). Cherchye et al. (2004) explained "BoD-based approach to composite indicators assigns data-generated weights, which in this context can overlook or overemphasize a few dimensions. This can happen if one or more variables in the data have zero endogenous weights, and the aggregation process ignores them as a result". In a similar context, Charles and Diaz (2017) argued "this situation of ignorance may occur because decision-making units (Banks) are evaluated and weighted using the simple BoD model".

As a result, the composite indices calculated using the simple BoD model may over-focus on one or a few dimensions in which the unit has performed best, completely ignoring the information available for other units. To avoid this issue, additional weight restrictions on endogenous weights have been implemented by measuring the lower and upper bounds of a particular dimension. The basic BoD model will be transformed to a constrained BoD model as:

$$L_{l,n} \leq \frac{T_{ln} s_{ln}}{\sum_{k=0}^{n} T_{ln} I_{ln}} \leq U_{l,n}$$

The lower and upper bounds on endogenous weight assigned to the Ith dimension for the nth unit are $L_{l,n}$ and $U_{l,n}$ respectively. The major problem of overfocussing the best dimension and the inclusion of outliers on the composite index score can be cured by assigning weights in the above manner. Since BoD is sensitive to dimensional scores of zero and one, each dimensional index is normalized with the measured mean and standard deviation from the data set until aggregation.

3.2 The Creation of a CSR Index for Public Sector Banks:

The following measures are taken to construct the composite CSR index: The first step necessitates the gathering of data on the Public Sector Banks' various social responsibility norms. In this sense, 48 measures of social responsibility were considered. The related qualitative and quantitative data for the 48 social responsibility norms were gathered from the Public Sector Banks' annual reports. For the calculation of the index, there are a total of 1200 (4825) observations. The second step is to assign binary code each CSR indicator, with 1 indicating that the bank complies with that CSR indicator and 0 indicating that it does not. Based on the main concept of corporate social responsibility of corporate houses discussed in the Companies Act and RBI regulations, the CSR norms of various indicators are grouped into four mutually exclusive distinct categories in this scenario. The dimensional indices were created in the third stage. The dimensional indices of each CSR dimension are obtained in the fourth step. The fifth and final step is to create a composite CSR index for Public Sector Banks by combining four dimensional CSR indices.

3.3 CSR Index Construction for Public Sector Banks

For the construction of dimensional indices, the aggregation of four distinct dimensions of the linear unweighted method is used to measure composite CSR index for Public Sector Banks. Researchers who use the linear unweighted approach often use the overall and basic dimensional CSR indexes. It's worth noting that this approach is used to build dimensional indices because all of the social responsibility indicators' responses are qualitative. The formula for calculating the dimensional indices is:

$$\text{CSR}_{\text{Dimensional Index}} = I_{l\,(l=1,\dots n)} = \frac{\sum_{r=1}^{s} yr,j}{S\,e,j}$$

Where $y_r = \{y_1, y_2 \dots \dots y_s\}$ and $y_{r,j} = 1$ if a bank is compliant to rth indicator/norm of CSR, $s_{e,j} = 1$ total maximum expected score of the CSR for j^{th} bank in m^{th} dimension. This approach is adopted to obtain four dimensional indices as:

1. Index environmental concerns: $\text{CSR}_{\text{environmental concerns}} \, I_{1(l=1,\dots n)} = \frac{\sum_{r=1}^{s} yr,j}{S\,e,j}$

2. Index human resources: $\text{CSR}_{\text{human resources}} = I_{2(l=1,\dots n)} = \frac{\sum_{r=1}^{s} yr,j}{S\,e,j}$

3. Index social products and service quality:

   $\text{CSR}_{\text{social products and service quality}} = I_{3(l=1,\dots n)} = \frac{\sum_{r=1}^{s} yr,j}{S\,e,j}$

4. Index community involvement: $\text{CSR}_{\text{community involvement}} = I_{4\,(l=1,\dots n)} = \frac{\sum_{r=1}^{s} yr,j}{S\,e,j}$

Thenon-normalized values of CSR dimensional indices show the comparative indices of PSBs of CSR indicators from 2008 to 2017.

As per the dimensional indices following observations are made:

1. Among all the dimensional indices, PSBs attained the highest average score of 0.75 in community involvement (dimension III) followed by 0.73 in social products and services (dimension IV) in the period 2008 to 2012. During the period from 2013 to 2017, the highest average score of 0.75 was achieved in social products and services closely followed by an average score of 0.73 in community involvement.
2. An average of the indices I and II was relatively low during the period 2008 to 2017 which depicts that banks adopted weak CSR norms in environmental concerns and human resources. Moreover, among the four dimensional indices the lowest average score of 0.30 was obtained by PSBs in environmental concerns.
3. State Bank of India reported dimensional index score of 1.0 in CSR guidelines pertaining to both environmental concerns and social products and service quality whereas it also recorded dimensional index score of 1.0 in community involvement along with the Canara bank. However, none reported dimensional index score of 1.0 in human resource.
4. Although banks performed well in dimensional indices of community involvement and social products and services but they performed below average in environmental concerns.
5. There were substantial variations in banks' obedience to mandatory social responsibility norms which can be inferred from variations among CSR indicators in the dimensional indices. In environmental concerns banks were highly efficient with score 1.0 whereas lowest score was 0.0. In human resource banks were highly efficient with score 0.89 whereas lowest score was 0.0. In social products and services banks were highly efficient with score 1.0 whereas on the other hand lowest score was 0.0. In community involvement banks were highly efficient with score 1.0 whereas on the other hand lowest score was 0.1.
6. In environmental concerns, five banks namely Oriental Bank of Commerce, State Bank of Mysore, State Bank of Patiala, UCO Bank and United Bank of India have lowest score of 0.0 depicting that they did not perform in this dimension.
7. In human resource concerns and community involvement indices, State Bank of Patiala attained the lowest score of 0.0 which depicts that the bank did not perform in these dimensions.
8. It is also noticed that among all selected dimensions, State Bank of India was found to be socially responsible as it was compliant with all the selected CSR dimensions except internal employee appreciation and reward in which the bank recorded less than one score. Whereas, State Bank of Patiala was found to be socially irresponsible because it had the lowest score of 0.0 in all the selected CSR dimensions.
9. PSBs were unable to fulfill the desired social responsibility norms which can be attributed to the unsatisfactory reporting of CSR expenditure by the banks. Moreover, higher NPAs also made it difficult for banks to invest in socially responsible activities.
10. It is noted that themajority of the PSBs were far from perfection in socially responsible indicators.

5. CONSTRUCTION OF CSR INDEX BY AGGREGATING DIMENSIONAL INDICES:

After calculating the dimensional indices for each Public Sector Bank from 2008 to 2017, the constrained BoD model is applied to the normalized values of four dimensional indices viz. Index of environmental concern, Index of human resources, Index of social products and service quality and

Index of community involvement to obtain idiosyncratic and endogenous weights. In this approach, the endogenous weights are generated on the actual data. After gathering endogenous weights specifically for dimensional indices they are aggregated to obtain the composite values of the CSR index. The calculated values of CSR index with the constrained BoD model is computed and reported in table 5.On the basis of BoD weights the PSBs are ranked as stated in table 6.

Table: 5 CSR Index using Constrained BOD Approach

BANK	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
B1	2.483337	2.483337	2.483337	2.483337	2.744197	2.744197	2.744197	2.744197	2.744197	2.744197
B2	2.349665	2.349665	2.349665	2.349665	1.676552	1.676552	1.676552	1.676552	1.676552	1.676552
B3	1.87057	1.87057	1.87057	1.87057	1.859869	1.859869	1.859869	1.859869	1.859869	1.859869
B4	2.684395	2.684395	2.684395	2.684395	2.676575	2.676575	2.676575	2.676575	2.676575	2.676575
B5	2.126868	2.126868	2.126868	2.126868	2.126793	2.126793	2.126793	2.126793	2.126793	2.126793
B6	2.833336	2.833336	2.833336	2.833336	2.833742	2.833742	2.833742	2.833742	2.833742	2.833742
B7	2.818035	2.818035	2.818035	2.818035	2.805573	2.805573	2.805573	2.805573	2.805573	2.805573
B8	2.649012	2.649012	2.649012	2.649012	2.647829	2.647829	2.647829	2.647829	2.647829	2.647829
B9	1.818423	1.818423	1.818423	1.818423	1.815994	1.815994	1.815994	1.815994	1.815994	1.815994
B10	2.191192	2.191192	2.191192	2.191192	2.556577	2.556577	2.556577	2.556577	2.556577	2.556577
B11	1.856495	1.856495	1.856495	1.856495	1.863712	1.863712	1.863712	1.863712	1.863712	1.863712
B12	2.272715	2.272715	2.272715	2.272715	2.730113	2.730113	2.730113	2.730113	2.730113	2.730113
B13	2.086718	2.086718	2.086718	2.086718	2.083268	2.083268	2.083268	2.083268	2.083268	2.083268
B14	3.17283	3.17283	3.17283	3.17283	3.161605	3.161605	3.161605	3.161605	3.161605	3.161605
B15	2.38339	2.38339	2.38339	2.38339	2.374081	2.374081	2.374081	2.374081	2.374081	2.374081
B16	1.992018	1.992018	1.992018	1.992018	1.991229	1.991229	1.991229	1.991229	1.991229	1.991229
B17	3.851596	3.851596	3.851596	3.851596	3.836968	3.836968	3.836968	3.836968	3.836968	3.836968
B18	2.267918	2.267918	2.267918	2.267918	2.264065	2.264065	2.264065	2.264065	2.264065	2.264065
B19	0.07889	0.07889	0.07889	0.07889	0.097763	0.097763	0.097763	0.097763	0.097763	0.097763
B20	2.676311	2.676311	2.676311	2.676311	2.676348	2.676348	2.676348	2.676348	2.676348	2.676348
B21	1.525144	1.525144	1.525144	1.525144	2.707496	2.707496	2.707496	2.707496	2.707496	2.707496
B22	2.313865	2.313865	2.313865	2.313865	2.306231	2.306231	2.306231	2.306231	2.306231	2.306231
B23	2.959131	2.959131	2.959131	2.959131	2.951367	2.951367	2.951367	2.951367	2.951367	2.951367
B24	2.247866	2.247866	2.247866	2.247866	2.728405	2.728405	2.728405	2.728405	2.728405	2.728405
B25	3.240278	3.240278	3.240278	3.240278	3.233648	3.233648	3.233648	3.233648	3.233648	3.233648

Source: As per author's calculations

Table: 6 Ranking of Banks according to CSR										
	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
ALLAHABAD BANK	10	10	10	10	10	7	7	7	7	7
ANDHRA BANK	12	12	12	12	12	24	24	24	24	24
BANK OF BARODA	21	21	21	21	21	22	22	22	22	22
BANK OF INDIA	7	7	7	7	7	11	11	11	11	11
BANK OF MAHARASHTRA	18	18	18	18	18	18	18	18	18	18
CANARA BANK	5	5	5	5	5	5	5	5	5	5
CENTRAL BANK OF INDIA	6	6	6	6	6	6	6	6	6	6
CORPORATION BANK	9	9	9	9	9	13	13	13	13	13
DENA BANK	23	23	23	23	23	23	23	23	23	23
INDIAN BANK	17	17	17	17	17	14	14	14	14	14
INDIAN OVERSEAS BANK	22	22	22	22	22	21	21	21	21	21
ORIENTAL BANK OF COMME RCE	14	14	14	14	14	8	8	8	8	8
PUNJAB & SIND BANK	19	19	19	19	19	19	19	19	19	19
PUNJAB NATIONAL BANK	3	3	3	3	3	3	3	3	3	3
STATE BANK OF BIKANER	11	11	11	11	11	15	15	15	15	15
STATE BANK OF HYDERABA D	20	20	20	20	20	20	20	20	20	20
STATE BANK OF INDIA	1	1	1	1	1	1	1	1	1	1
STATE BANK OF MYSORE	15	15	15	15	15	17	17	17	17	17
STATE BANK OF PATIALA	25	25	25	25	25	25	25	25	25	25
STATE BANK OF TRAVANCO RE	8	8	8	8	8	12	12	12	12	12
SYNDICATE BANK	24	24	24	24	24	10	10	10	10	10
UCO BANK	13	13	13	13	13	16	16	16	16	16
UNION BANK OF INDIA	4	4	4	4	4	4	4	4	4	4
UNITED BANK OF INDIA	16	16	16	16	16	9	9	9	9	9
VIJAYA BANK	2	2	2	2	2	2	2	2	2	2

Source: As per author's calculations.

Following inferences are drawn from tables 5 and 6:
1. There are different values with the calculated lower bound of different years for different PSBs. The value of obtained idiosyncratic weights varied between 0.097 and 3.83 during 2008 to 2017. Continuous mandatory and regulatory norms of CSR have compelled PSBs to show higher participation in CSR norms.
2. It is observed from table 6 that thefirst rankwas obtained by State Bank of India followed by Vijaya Bank. On the other hand it is witnessed that State Bank of Patiala and Syndicate Bank obtained the lowest ranks among PSBs.
3. After analyzing the BoD generated weights, it is witnessed that the weights were similar for the years 2008 to 2012. It can be attributed to RBI directions in 2007-08 to contribute in

Sustainable Development, Corporate Social Responsibility and Non-financial reporting in 2007. The weights are also similar from 2013 to 2018 which may be due to the amendments introduced in the Companies Amendment Act 2013 for companies and banks.

4. The relative weightsof four indicators of Social products and services, Community Involvement, Human Resource and Environment varied from high to low in order for estimating CIs for CSR for the period 2008-2011. On the other hand the relative weights of indicators Community Involvement, Social products and services, Human Resource and Environment varied from high to low in order for estimating CIs for estimating CSR of PSBs for the period 2012-2018.

5.   Conclusions:

1. PSBs attained the highest average score of 0.75 in community involvement (dimension III) followed by 0.73 in social products and services (dimension IV) in the period 2008 to 2012. During the period from 2013 to 2017, the highest average score of 0.75 was achieved in social products and services closely followed by an average score of 0.73 in community involvement. An average of the indices I and II was relatively low during the period 2008 to 2017 which depicts that banks adopted weak CSR norms in environmental concerns and human resources dimensional indices.

2. State Bank of India reported score of 1.0 in CSRguidelines pertaining to both environmental concerns and social products and service quality whereas it also recorded dimensional index score of 1.0 in community involvement along with the Canara bank. However, none reported dimensional index score of 1.0 in human resource.

3. The empirical results reveal that considerable efforts have been made by PSBs to fulfill the social responsibility regulation in India since December, 2007. Although, all the PSBs were statistically indistinguishable in terms of CSR, the social responsibility of State Bank of India outperformed among PSBs in specified dimensions and has exclusively invested in the different dimensions of CSR.

4. The other PSBs didn't fulfill the prescribed targets of social responsibility which can be due to the unsatisfactory reporting of CSR expenditure by the banks. Higher NPAs also made it harder for banks to invest in socially responsible activities.

5. Continuous mandatory and regulatory norms among CSR have compelled Public Sector Banks to show higher participation in CSR norms. It is evident from the generated weights that State Bank of India and Vijaya Bank were socially efficient banks securing first and second rank in CSR index respectively.

6. It is also being noted that the majority of the Public Sector Banks are far from perfection in socially responsible indicators apart from the mandatory norms introduced by government of India.

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Appendix -1

Table 1 Index Environmental Concerns										
BANK	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
B1	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
B2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
B3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
B4	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44
B5	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
B6	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
B7	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
B8	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
B9	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
B10	0.1	0.1	0.1	0.1	0.1	0.4	0.4	0.4	0.4	0.4
B11	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
B12	0.2	0.2	0.2	0.2	0.2	0.5	0.5	0.5	0.5	0.5
B13	0	0	0	0	0	0	0	0	0	0
B14	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7

Table 2 Index Human Resources										
BANK	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
B1	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.62
B2	0.46	0.46	0.46	0.46	0.46	0.54	0.54	0.54	0.54	0.54
B3	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46
B4	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.62
B5	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54
B6	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.62
B7	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.62
B8	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.62
B9	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31
B10	0.62	0.62	0.62	0.62	0.69	0.69	0.69	0.69	0.69	0.69
B11	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.62
B12	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.62
B13	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.62
B14	0.69	0.69	0.69	0.69	0.69	0.69	0.69	0.69	0.69	0.69

B15	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
B16	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
B17	1	1	1	1	1	1	1	1	1	1
B18	0	0	0	0	0	0	0	0	0	0
B19	0	0	0	0	0					
B20	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
B21	0.3	0.3	0.3	0.3	0.3	0.4	0.4	0.4	0.4	0.4
B22	0	0	0	0	0	0	0	0	0	0
B23	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
B24	0	0	0	0	0	0.5	0.5	0.5	0.5	0.5
B25	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
Avg	0.30	0.30	0.30	0.30	0.30	0.35	0.35	0.35	0.35	0.35

Source: Author's calculation

B15	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54
B16	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46
B17	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
B18	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54
B19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
B20	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
B21	0.62	0.62	0.62	0.62	0.62	0.69	0.69	0.69	0.69	0.69
B22	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77
B23	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
B24	0.69	0.69	0.69	0.69	0.69	0.69	0.69	0.69	0.69	0.69
B25	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Avg	0.60	0.60	0.60	0.60	0.60	0.61	0.61	0.61	0.61	0.61

Source: As per author's calculations

Table 3 Index Social Products and Service Quality										
BANK	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
B1	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75

Table 4 Index Community Involvement										
BANK	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
B1	0.64	0.64	0.64	0.64	0.64	0.91	0.91	0.91	0.91	0.91

B2	1.00	1.00	1.00	1.00	1.00	0.42	0.42	0.42	0.42	0.42	0.45	0.45	0.45	0.45	0.45	0.50	0.50	0.50	0.50	0.50
B3	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45
B4	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82
B5	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73
B6	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
B7	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82
B8	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
B9	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.64	0.64	0.64	0.64	0.64	0.64	0.64	0.64	0.64	0.64
B10	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82
B11	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.64	0.64	0.64	0.64	0.64	0.64	0.64	0.64	0.64	0.64
B12	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.64	0.64	0.64	0.64	0.64	0.82	0.82	0.82	0.82	0.82
B13	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73
B14	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
B15	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73
B16	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55
B17	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
B18	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9

	3	3	3	3	3	3	3	3	3	3
B19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
B20	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
B21	0.50	0.50	0.50	0.50	0.50	0.83	0.83	0.83	0.83	0.83
B22	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
B23	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
B24	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
B25	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Avg	0.75	0.75	0.75	0.75	0.75	0.73	0.73	0.73	0.73	0.73

Source: As per author's calculations.

	1	1	1	1	1	1	1	1	1	1
B19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
B20	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
B21	0.09	0.09	0.09	0.09	0.09	0.82	0.82	0.82	0.82	0.82
B22	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73
B23	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82
B24	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82
B25	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Avg	0.71	0.71	0.71	0.71	0.71	0.75	0.75	0.75	0.75	0.75

Source: As per author's calculations.