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Multivariate Bank Performance Analysis using Standardized CAMEL Methodology and Fuzzy Analytical Hierarchical Process

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Abstract

Objective: To minimise the subjectivity of the CAMEL approach by applying FAHP for ranking the banks playing an important role in Indian financial system and also aims to help the investors to make informed decisions. **Methods/Statistical Analysis**: Banks listed in the CNX bank Index and National Stock Exchange are selected for the validating the model. The trading frequency of about 90 percent for the last six months and positive net worth are additional criteria imposed for the purpose. FAHP is used to assign weights to the main and Sub criteria designed for the purpose of ranking of the banks. TFN is used for the verbal judgements and the criteria weights are assigned to the CAMEL ratios and the final scores are calculated. **Findings**: CAMEL finds its worldwide applicability in measuring the performance of the banks but on subjective way. It is needed to provide objectivity in the subjective judgment to eliminate confusion. The FAHP approach is used to assign weights to the CAMEL parameters to judge the ranking positions of the Indian banks for the purpose. Use of FAHP in CAMEL ratios is a unique work which will help to rank the banks according to their performance and help to make informed decisions. As per the findings it is revealed that, in Indian financial system SBI's performance is highest and Central Bank's performance is lowest. The present work will complement the effort of the policy makers and general investors to understand the performance of the banks in the Indian financial system through an objective approach to the subjective judgmental process. **Application/ Improvements:** The study mainly concentrated on developing a bank rating model with the use of Fuzzy Logic for effective rating of the banks in India. The present scope can be extended to include larger data sets and diverse economic conditions.

Keywords: Bank Rating, CAMEL, FAHP, Multivariate Bank Performance Analysis

1. Introduction

Financial systems in modern day world rely heavily on the healthy banking system operative within the realms of the financial interactions. A robust and resilient banking system can ensure stability. The rules and regulations of the regulatory bodies aim to ensure the stability. An interconnected economic system in the world ensures that no economy remains isolated. Depression in one country's banking system bears highest probability to aggravate the whole world economy. The same has been witnessed by the world during subprime crisis in USA, debt problem in Greece. Now-a-days banking is the most heavily regulated business in the world. The industry comprises of public and private banks and new age banks, all competing to grab the larger share of the market share pie. Competition and the race to remain relevant in the market often drive

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the players to get attracted towards highly sophisticated techniques for bypassing the regulatory restrictions. Rating methodologies developed thus aims to highlight the inherent strong ones from the not so strong ones to make informed decisions. Increased volatility in the economy coupled with economic crisis has made the rating of the banks even more relevant. Rating agencies like Moody's, Standard and Poor's etc. assign certain symbols to each banks based on their credit worthiness. While investing in any bank investors can go through the ratings given by those agencies. But, it is very difficult for the layman investor to infer the symbols. Apart from the methodologies adopted by the rating agencies, some other techniques like CAMEL, GIRAFE[1,2] are also readily available and approved by various countries central banks. However, the pertinent question remains whether the methodologies are objectively or subjectively defined.

CAMEL is a well used method for rating banks, especially in India. Various studies highlight the use of CAMEL ratios for ranking banks[3–6]. Keeping in line with the objective of supervision, Committee[1] formed for the purpose proposed the ranking methodology for banks in line of the CAMELS rating model originally developed in the USA. The banks were graded and rated on a five point scale of A to E. The focus of the rating was to take care of the dimensions of financial soundness, operational aspects and managerial efficiency. RBI evolved its rating model keeping in line with the committees recommendation and CAMEL guidelines and focussed on CAMELS i.e. capital adequacy, asset quality, management, earnings, liquidity and systems and control. The overall rating was designed to be a summation of all the values of the parameters weighted on a scale of 1 to 100.

3. CAMEL and its Adaptability

In order to understand and identify the safety and soundness of the banks much of the earlier studies focused on the applicability of the CAMEL approach. Literature reveals that studies have considered CAMEL ratio and have stated that the ratio can minimise the potential risks which may lead to bank failures. Several studies have also focused to determine the role played by CAMEL ratio in banking supervision. Limitation of the ratio was discussed and it was identified that rating by use of CAMEL ratio is not considering the bank's top management performance and overlooking the provisions as well as allowance for loan loss ratios[7].During the performance evaluation of one of the bank in Bangladesh, it was revealed that capital adequacy can be tampered with to enhance bank's performance and meet regulatory requirement also[8]. It was observed during the performance evaluation of State Bank of India group that SBBJ and SBP were in top position in terms of Capital Adequacy, whereas SBI secured lowest rank[9]. Performances of Indian banks were also ascertained with the help of CAMEL approach[6].

A multivariate discriminant model is developed to differentiate between low efficiency and high efficiency community banks by considering CAMEL approach[10]. The data range is from 2006-08 for empirical purpose by considering both high performance and depressionary condition.

However, according to the Leadership Corporation Australia[11] CAMEL approach suffers from the limitations of subjectivity, indeterminacy and inconsistency. Financial ratios always measure the past performance not the future performance. Financial ratios are calculated based on the past data with the help of which the future can be estimated to some extent[12]. The problem of indeterminacy says that the problem of two extremes can be measured like good performance or bad performance, but to decide on in between performance is very difficult task. Sometimes one has to give subjective judgment which again may create some problems. Ratio analysis is more of subjective than objective. Financial ratios are always inconsistent, as a change in any ratio affects the whole decision.

After analysis of SBI group[9] no significant difference was observed in the performance of the banks using CAMEL ratio approach. In one of the study application of ordered logit model is observed in the S&P rating and quarterly CAMELS rating is analyzed in a panel data framework[4]. It is found that in the S&P rating, the exclusive information at the regulator's disposal provides a certain extrapolative advantage over outside observers, but this is not so in the CAMELS rating case. In CAMELS,

an observer can reproduce the same information as the regulator. CAMELS explain on an average variability of about 84 percent.

A modified CAMEL ratio is used in one of the research papers[5]. As CAMEL ratio does not show the degree of difference in performance, it affects the ranking of the banks. Therefore, a Modified CAMEL ratio approach was used instead of CAMEL ratio to rank the banks. The user will not get any benefit for using CAMEL ratio to rank the banks[13] as the confidential information is mostly used by the assessor and the bank management. Therefore, some financial ratios and AHP are used for ranking purpose. A new method TOPSIS with AHP is used to understand Turkey's private banks' performance. Experts are of opinion that availability of information does not always help us to take decision; rather making balance decision is important[14]. Informed decision together with subjective and objective framework is more comprehensive. Apart from this, the information should be transparent and should include all the stakeholders view for making informed decisions. For this reason, keeping the limitations of CAMEL approach in mind, application of FAHP in bank ranking is required for the purpose. In this study the CAMEL ratios are used in FAHP to reduce the subjectivity of the ratios.

During merger and acquisition planning AHP is used by the authors to plan business in order to design strategic planning[15]. The AHP also provides a useful, simple and powerful tool for dealing with strategic planning in banking[16]. AHP can be used in decision making process[17]. Several earlier studies have focussed on the use of AHP in the domains of bond management, portfolio management, investment management and banking performance [16,18–24]. However, very little evidence is found on the studies focussing on specific use of Fuzzy AHP in analysing performance of banks.

Multi-criteria Analysis (MA) problem often involves evaluating the criteria to arrive at a particular decision. In order to choose a bank for investment purpose, several criteria needs to be considered and hence, the problem associated with selecting a best performing bank falls in the ambit of Multi-criteria Analysis (MA) problem. Human judgement and its mapping into any crisp number is always a very difficult task due to the subjectivity associated with the human decision making process. The subjectivity and the vagueness associated with human decision making process are taken care by Fuzzy Analytical Hierarchical Process (FAHP). Several studies have considered AHP in designing a support system to arrive at conclusions. For empirical analysis 12 commercial banks were evaluated using 17 financial performance indicators and with the application Fuzzy Technique for Order Preference by Similarity to Ideal Solution (henceforth Fuzzy TOPSİS) method and Fuzzy Analytic Hierarchy Process (henceforth Fuzzy AHP) methods. With the help of these two fuzzy approaches the banks are ranked and show that both the methods are presenting the same result. On the other hand, another study is done on the Bulgaria banking system and applied FAHP[25]. In the paper, a fuzzy logic model is proposed for analysis and estimates the banking system stability in Bulgaria. The capital adequacy and liquidity are considered as the two main financial indicators highlighting banking performance. The banks are divided in two groups and analyse the group wise performance by using FAHP. After empirical analysis, the banking system of Bulgaria is found stable and they can absorb negative economic shocks.

3. Methodology

In order to apply the ranking framework using FAHP, the essential element requires to be fulfilled is to assign weights to the criteria. The criteria considered were classified as main criteria and Sub criteria. With the help of specially designed questionnaire the linguistic preference of the experts are captured and transformed into weights. The criteria weights so generated are assigned to the CAMEL ratio calculated from the secondary database of RBI.

The sample selected for the study was based on the sampling frame culled out form the listed banks in CNX bank Index and National Stock Exchange. The trading frequency of about 90 percent for the last six months and positive net worth were additional criteria imposed for ample selection much in line with earlier studies[14]. Based

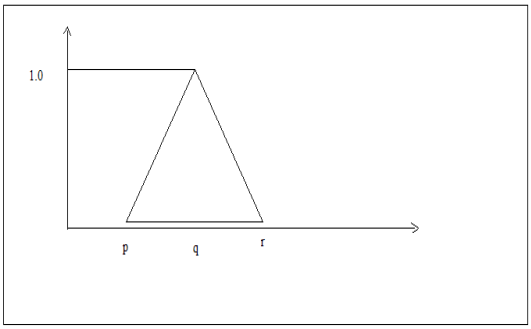
on the above discussed criteria the following banks; Axis Bank Ltd. Bank of Baroda (BOB), Bank of India (BOI), Yes Bank, HDFC Bank Ltd (HDFC Bank), ICICI Bank Ltd (ICICI Bank), IDBI Bank Ltd (IDBI Bank), Union bank of India, Allahabad Bank, State Bank of India (SBI), Punjab National Bank (PNB), United Bank of India (UBI), Indian Overseas Bank (IOB), Central Bank of India, and Dena Bank were selected for the study.

4. Fuzzy Sets, TFN and FAHP

The extent of exclusion of middle to decide between the good and the bad gave credence to the law of excluded middle. However, over the years it has been observed that exclusion of middle often leads to imprecise results. Efforts were made to take into account all the range within the scale of judgement. Any human judgement and the capacity of mind to relate the reasoning to crisp data are often seen to encounter objectification problem. The vagueness of human thoughts was taken into consideration and mapped into a continuum scale of zero to one as defined in the fuzzy set. By assigning membership function, fuzzy theory takes into account the fuzziness in the human perception and decision making process. "Fuzzification" helps to generalize any crisp set to a fuzzy set having Crisp boundaries[14].

Triangular fuzzy number (TFN) is special class of fuzzy numbers the membership of which is defined by class of three real numbers expressed as (p, q, r). The following figure details the structure of a Triangular Fuzzy Number (TFN). The triangular fuzzy numbers is represented as follows[26].

$$\mu_B = \begin{cases} \dfrac{x-p}{q-p}, p \le x \le q \\ \dfrac{r-x}{r-q}, q \le x \le r \\ 0, otherwise \end{cases} \quad (1)$$



The two triangular fuzzy numbers Q_1 and Q_2 have the following operational law:

$$Q_1 + Q_2 = (p_1 + p_2, q_1 + q_2, r_1 + r_2). \quad (2)$$

$$Q_1 \times Q_2 = (p_1 p_2, q_1 q_2, r_1 r_2). \quad (3)$$

4.1 Analytic Hierarchy Process (AHP)

As a tool for effective decision making in problems having multi criteria AHP gained its popularity and the concept of AHP was proposed by Satty[27]. AHP process takes into consideration both the subjective and objective aspects in the decisions making process and arrive at a logical conclusion in the complex decisions making framework. The AHP process got popular amongst the researcher due to its simplicity and wider applicability. Evaluation criteria and the alternative options are considered by the AHP to make best decision[28]. AHP arrives at the weights of the criteria by means of pair wise comparison and by finding the Eigen vector in order to assign the scores. Vector rotated matrix takes into account the problem of transitivity and scores are generated in a way such that the order of highest to lowest is maintained. Higher score signifying the option to be better with respect to those criteria. Thereafter, to get a rank, AHP determines a global score by combining weight of criteria and weight of alternative option.

4.2 Fuzzy-Analytic Hierarchy Process (Fuzzy AHP)

Although AHP gained its popularity, the limitations of the process in assigning exact score to the human decisions making process and subjective judgement acted as one of the greatest limitations. FAHP is a hybrid approach which takes into consideration the limitations of the AHP process and thus comes with an alternative approach. The study proposes to use FAHP in order to generate weights for the main criteria and Sub criteria. Verbal judgements are mapped to the Triangular Fuzzy number as proposed as displayed in Table 1. In order to eliminate the limitations of the AHP, reciprocal of verbal judgements is deliberately not considered while mapping verbal judgements to Triangular Fuzzy Numbers[29]. Triangular fuzzy numbers corresponding to various verbal judgments is stated using Table 1 and Figure 1.

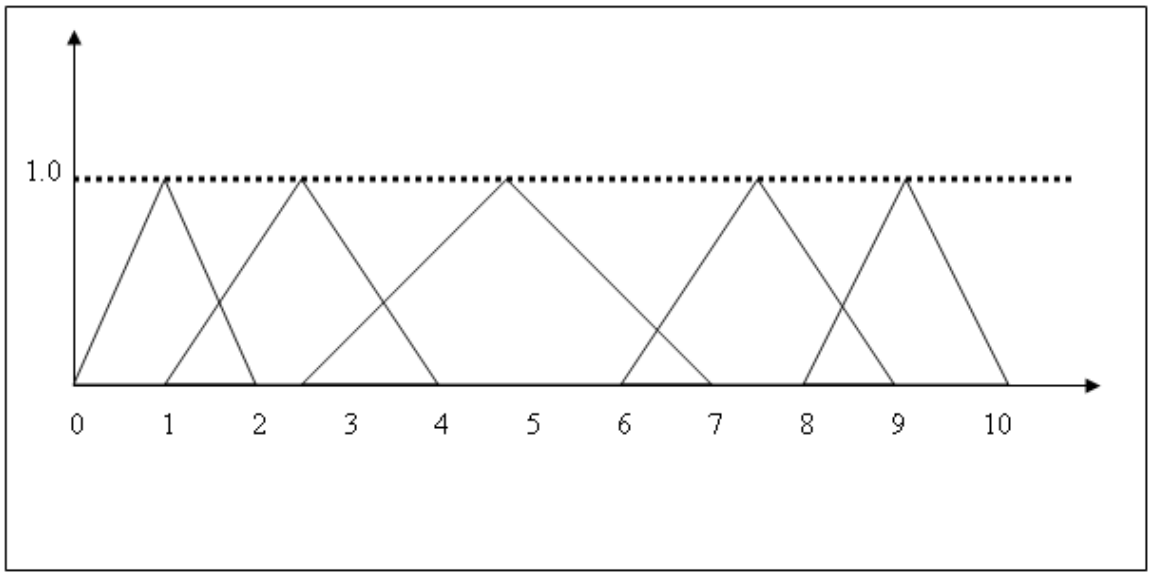


Figure 1. TFN's for verbal judgment.

Table 1. Preference scale of fuzzy linguistic

Verbal judgment	Description	Triangular Fuzzy number
VERY LOW(VL)	A response is most unpleasant	(0, 1, 2)
LOW (L)	A response is slightly unpleasant	(1, 2.5, 4)
MEDIUM (M)	A response is average	(3, 5, 7)
HIGH (H)	A response is excellent	(6, 7.5, 9)
VERY HIGH (VH)	A response is very excellent	(8, 9, 10)

5. Evaluation Methodology

5.1 Construction of Hierarchy

In order to establish relational dynamics between the main criteria and the sub criteria, the criteria were identified and ladder structure was formed to depict the relationship. The ladder model is constructed by considering the CAMEL ratios and sub ratios as depicted below:

6. Fuzzy Pair Wise Comparison and its Evaluation

The expert ranking of the criteria as included in the questionnaire having pair wise and its comparison was performed as per the formulation designed for the study. Perceived importance of the criteria by the experts and its mapping was performed using comparison matrix involving TFN.

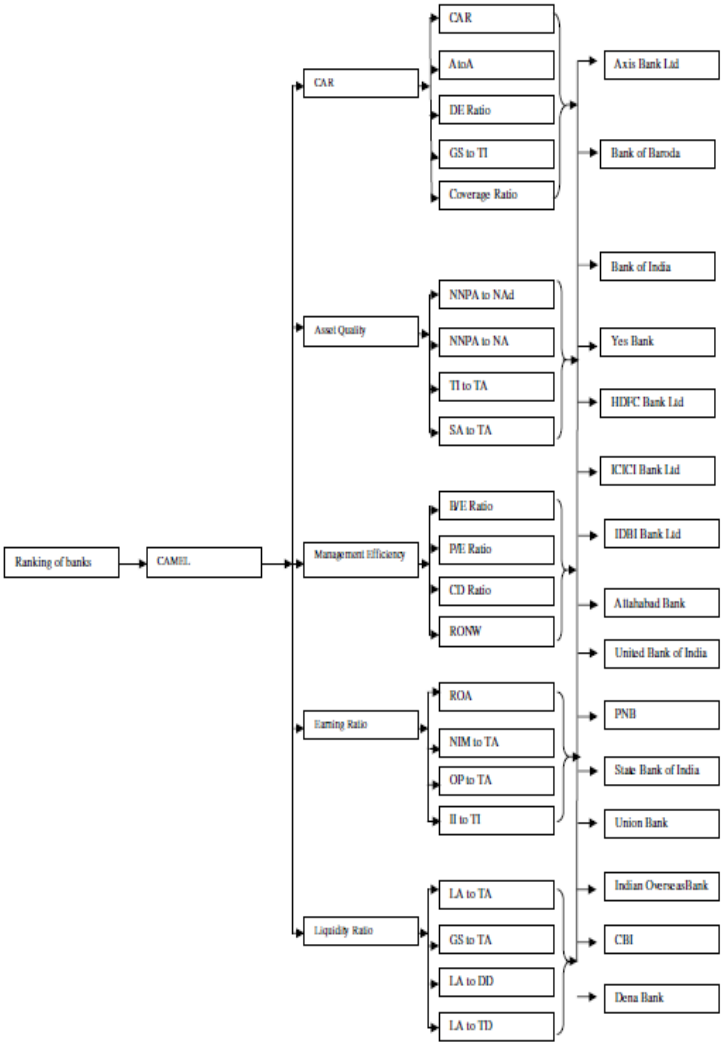


Figure 2. Structure of the problem.

Questionnaire of such evaluation is given in Annexure 1. Expert opinion was collected with the help of the questionnaire and the results were subjected to analytical processing to generate the weights. Coding for positive responses were straight forward and mapped as the table values. However, for negative responses, the judgement components were inversed the coding of for the positive response are considered as per the proposed Buckley's method. Transitivity problem of the conventional AHP process in pair wise comparison is taken care by Buckley's method. The structure of the problem was shown in Figure 2.

In the decision making environment the dimensions of optimism, pessimism and most likely values are mapped in the triangular fuzzy numbers, thus the fuzzy comparison matrix is defined as

$$\widetilde{B} = \begin{pmatrix} 1 & \widetilde{b}_{12} & \ldots & \widetilde{b}_{1n} \\ \widetilde{b}_{21} & 1 & \ldots & \widetilde{b}_{2n} \\ \widetilde{b}_{31} & \widetilde{b}_{32} & 1 & \widetilde{b}_{3n} \\ .. & \ldots & \widetilde{b}_{nn-1} & 1 \end{pmatrix} \quad (1)$$

$$\widetilde{b}_{ij} = \begin{pmatrix} P & Q & R \\ b_{ij} & b_{ij} & b_{ij} \end{pmatrix}$$

Represents the importance of each criterion in the pair wise comparison matrix and b_{ij}^{P}, b_{ij}^{Q}, b_{ij}^{R} represents the dimensions of optimism, most likely and pessimistic environment. In order to simplify the process of calculation of the fuzzy weights the following crisp matrix B_P, B_Q, B_R were used.

7. Calculation of Element Weight

The weights of the criteria from the fuzzy pair wise comparison matrix were performed using Geometric Mean (NGM) method[30] as per the formulation

$$\alpha_i = b_i \Big/ \sum_{i=1}^{n} b_i ,$$

where

$$b_i = \left(\prod_{j=1}^{n} b_j \right)^{1/n}$$

Where,

b_i is the geometric mean of criterion i,

b_{ij} is the comparison value of criterion i to criterion j

α_i is the i[th] criterion's weight,

and $\alpha_i > 0$ and $\sum_{i=1}^{n} \alpha_i = 1$.

In order to make group assessment, the opinion of the evaluator is aggregated into one. The aggregation of the experts' judgments is done using average mean in the following way, where, $E_i = \left(b_P^{(i)}, \; b_Q^{(i)}, \; b_R^{(i)}\right)$,

$$\widetilde{B} = \left(\frac{1}{n}\sum_{i=1}^{n} b_P^{(i)}, \frac{1}{n}\sum_{i=1}^{n} b_Q^{(i)}, \frac{1}{n}\sum_{i=1}^{n} b_R^{(i)}, \right) \quad (2)$$

$$(w_k \times s_{ki}) \quad (3)$$

represents weight of i[th] sub criteria under k[th] main criteria.

Where,

w_k is the k[th] main criteria weight

Table 2. Main criteria weights

Main Criteria	Local weight		
	(p	q	r)
Capital adequacy ratio(C1)	0.25	0.25	0.23
Asset Quality ratio (C2)	0.20	0.22	0.22
Management Efficiency ratio (C3)	0.36	0.22	0.22
Earnings ratio (C4)	0.11	0.16	0.17
Liquidity Ratio (C5)	0.10	0.16	0.17

s_{ki} is the weight of ith sub criteria with respect to kth main criteria.

The following equation represents crisp weight after defuzzification process[31]

$$s_i = \left(\frac{\left(\frac{1}{n}\sum_{i=1}^{n} b_P^{(i)} + 2\left[\frac{1}{n}\sum_{i=1}^{n} b_Q^{(i)} \right] + \frac{1}{n}\sum_{i=1}^{n} b_R^{(i)} \right)}{4} \right) \quad (4)$$

Table 2 to 5 show the weights of main criteria and the sub criteria along with the defuzzified value of the criteria weights respectively. The main criteria weight and sub criteria weights are shown in Table 2 and 3.

The last row of the Table 4 describes the overall performance of the banks taken into consideration.

In order to evaluate the ranking of the banks, the scores obtained by each of the bank is calculated and compared. CAMEL ratio is calculated from the secondary data as published by RBI. In order to neutralize the effect of scale the values of the CAMEL ratio is normalized.

The final score of the pth alternative is obtained by

$$Bp = \sum_{l=1}^{N} s_q \times b_{pq} \quad (5)$$

Where s_l is the weight of l^{th} sub criteria and b_{ml} is the weight of m^{th} alternative with respect to l^{th} sub criteria and the result is depicted in Table 5.

Table 3. Sub criteria weights

Sub criteria	Global Weight			Defuzzified Weight
	(p	q	r)	(W)
Capital Adequacy Ratio	0.07680	0.05646	0.05069	0.06011
Advances To Assets	0.05953	0.05640	0.05110	**0.05586**
Debt Equity Ratio	0.03667	0.04595	0.04316	**0.04293**
Govt. Security To Total Investments	0.03154	0.04073	0.03984	**0.03821**
Coverage Ratio	0.04681	0.04486	0.04256	0.04477
Net NPA To Net Advance	0.07704	0.06633	0.06202	**0.06793**
Net NPA To Net Assets	0.06163	0.06355	0.06068	**0.06235**
Total Investment To Total Assets	0.02213	0.04257	0.04440	**0.03792**
Standard Advances To Total Assets	0.03470	0.05138	0.05168	0.04728
Business Per Employee	0.11309	0.06113	0.05978	**0.07378**

Table 3 Continued

Profit Per Employee	0.08459	0.06174	0.06058	**0.06716**
Credit Deposit Ratio	0.09473	0.05432	0.05484	**0.06455**
Return On Net Worth	0.04760	0.04034	0.04349	0.04294
Return On Asset	0.05718	0.05688	0.05552	**0.05661**
NIM To Total Asset	0.02529	0.03967	0.04272	**0.03684**
Operating Profit to Total Asset	0.01100	0.03307	0.03733	**0.02862**
Interest Income To Total Income	0.01649	0.02879	0.03356	0.02691
Liquid Asset To Total Asset	0.02973	0.03936	0.04123	**0.03742**
Govt. Securities To Total asset	0.01733	0.03630	0.03988	**0.03245**
Liquid Asset To Demand Deposit	0.02996	0.04042	0.04284	**0.03841**
Liquid Asset To Total Deposit	0.02395	0.03892	0.04210	0.03694

Table 4(a). Overall scores of the alternatives

Alternatives	Final Score sheet for different Banks with respect to different Criteria						
Criteria	**BANK OF BORODA**	**AXIS BANK**	**YES BANK**	**ALLAHABAD BANK**	**BANK OF INDIA**	**UNION BANK**	**UNITED BANK OF INDIA**
Capital Adequacy Ratio	0.003837	0.004613	0.005380	0.003705	0.003610	0.003721	0.003681
Advances To Assets	0.004495	0.003472	0.005331	0.004495	0.004495	0.005331	0.003472
Debt Equity Ratio	0.001625	0.001044	0.001377	0.001685	0.005731	0.003142	0.002022
Govt. Security To Total Investments	0.003197	0.002397	0.002631	0.003105	0.003167	0.003009	0.002786
Coverage Ratio	0.003167	0.003410	0.003693	0.002828	0.002800	0.002865	0.002788
Net NPA To Net Advance	0.001126	0.000487	0.000056	0.002739	0.002155	0.002113	0.004185
Net NPA To Net Assets	0.021920	0.004400	0.000448	0.001463	0.000389	0.001180	0.001970
Total Investment To Total Assets	0.001768	0.002751	0.003564	0.002599	0.001991	0.002273	0.002754
Standard Advances To Total Assets	0.000667	0.000811	0.001753	0.000599	0.000085	0.000667	0.008830
Business Per Employee	0.003859	0.000032	0.004764	0.002407	0.003843	0.002965	0.002506

Table 4a Continued

Profit Per Employee	0.009095	0.000126	0.000180	0.000054	0.000054	0.000063	0.000873
Credit Deposit Ratio	0.004916	0.004387	0.003080	0.004156	0.004325	0.004646	0.003826
Return On Net Worth	0.003924	0.004346	0.004372	0.003707	0.002753	0.003461	0.000713
Return On Asset	0.002183	0.003788	0.003609	0.002005	0.001493	0.001961	0.000535
NIM To Total Asset	0.002308	0.003108	0.002400	0.002558	0.002108	0.002475	0.002258
Operating Profit Total Asset	0.001039	0.002340	0.002010	0.001630	0.000135	0.001512	0.001360
Interest Income To Total Income	0.003254	0.001144	0.003164	0.000140	0.003254	0.001996	0.000268
Liquid Asset To Total Asset	0.001541	0.000715	0.000726	0.000577	0.000109	0.000971	0.008069
Govt. Securities To Total asset	0.002302	0.002687	0.003487	0.003287	0.000257	0.002782	0.003101
Liquid Asset To Demand Deosit	0.001629	0.003482	0.006358	0.000965	0.001699	0.003066	0.000007
Liquid Asset To TotalDeposit	0.002320	0.001217	0.001074	0.001063	0.001691	0.001478	0.011910
Overall score	0.080173	0.050758	0.059457	0.045766	0.046143	0.051678	0.067914

Table 4(b). Overall scores of the alternatives

Alternatives	Final Score sheet for different Banks with respect to different Criteria							
Criteria	**INDIAN OVEARSES BANK**	**CENTRAL BANK**	**IDBI NANK**	**SBI**	**ICICI BANK**	**PNB**	**HDFC**	**DENA BANK**
Capital Adequacy Ratio	0.003776	0.003484	0.004070	0.003613	0.005177	0.003883	0.003837	0.003717
Advances To Assets	0.003472	0.000207	0.004796	0.002916	0.001878	0.003773	0.004495	0.003231
Debt Equity Ratio	0.002077	0.003327	0.005209	0.002254	0.004607	0.004088	0.001625	0.003123
Govt. Security To Total Investments	0.003297	0.000328	0.002919	0.002561	0.002147	0.000318	0.003197	0.003153
Coverage Ratio	0.002665	0.002414	0.003065	0.002803	0.003095	0.002919	0.003167	0.003091
Net NPA To Net Advance	0.002989	0.003086	0.002155	0.002739	0.001585	0.039386	0.001126	0.002002
Net NPA To Net Assets	0.001616	0.000012	0.000047	0.003964	0.000720	0.001215	0.021920	0.001085
Total Investment To Total Assets	0.002320	0.002396	0.002615	0.003447	0.002847	0.002312	0.001768	0.002513
Standard Advances To Total Assets	0.006253	0.000825	0.000694	0.016439	0.002153	0.001191	0.000667	0.005647

Table 4b Continued

Business Per Employee	0.003032	0.002402	0.006501	0.011788	0.019696	0.002885	0.003859	0.003240
Profit Per Employee	0.000027	0.002087	0.034157	0.004480	0.001044	0.000072	0.009095	0.005757
Credit Deposit Ratio	0.004415	0.003237	0.004947	0.004247	0.004979	0.004450	0.004916	0.004023
Return On Net Worth	0.001821	0.002016	0.002203	0.000176	0.002334	0.003739	0.003924	0.003455
Return On Asset	0.001003	0.000713	0.001426	0.027917	0.003320	0.002495	0.002183	0.001983
NIM To Total Asset	0.002217	0.002225	0.001617	0.003450	0.002375	0.003058	0.002308	0.002375
Operating Profit Total Asset	0.001292	0.000008	0.000017	0.012907	0.000017	0.001951	0.001039	0.001360
Interest Income To Total Income	0.001981	0.000925	0.002592	0.001194	0.000049	0.000329	0.003254	0.003365
Liquid Asset To Total Asset	0.007007	0.000200	0.000631	0.006285	0.000835	0.000724	0.001541	0.007485
Govt. Securities To Total asset	0.003111	0.000319	0.003101	0.002606	0.002490	0.000300	0.002302	0.000322
Liquid Asset To Demand Deosit	0.000850	0.002052	0.005207	0.002897	0.004762	0.000789	0.001629	0.003020
Liquid Asset To TotalDeposit	0.001102	0.000582	0.001148	0.000833	0.001966	0.001136	0.002320	0.007103
Overall score	0.056322	0.032846	0.089115	0.119516	0.068074	0.081013	0.080173	0.071050

Table 5. Overall Ranking of the banks

Sl. No.	Final Score	Banks
1	0.119516367	SBI
2	0.089115461	IDBI BANK
3	0.081013283	PNB
4	0.08017273	BANK OF BORODA
5	0.08017273	HDFC
6	0.071050493	DENA BANK
7	0.06807381	ICICI BANK
8	0.067914235	UNITED BANK OF INDIA
9	0.059456969	YES BANK
10	0.056322491	INDIAN OVEARSES BANK
11	0.051678222	UNION BANK
12	0.050757639	AXIS BANK
13	0.04614297	BANK OF INDIA
14	0.045766412	ALLAHABAD BANK
15	0.032846188	CENTRAL BANK

8. Ranking the Alternatives

Table 5 represents ranking status of the banks based on their overall score.

9. Conclusion

The interaction amongst the economic systems around the world is bound to produce ripple effects. However

good and robust an economic system aspire to become, to completely isolate economic systems is seemingly impossible. Events and seemingly unrelated phenomenon can have interlinked effects. The phenomenon of interlinked effects is even more pronounced in case of banking systems. Banking systems provides stability to the economic systems and thus play a very important role in the economy. The stability of the banking system in turn becomes even more important. In response to the need rating and ranking of banks emerged. The rating systems mainly use two approaches, quantitatively and qualitatively, which is a useful tool to examine the safety and soundness of banks. The problem of indeterminacy says that the problem of two extremes can be measured like good performance or bad performance, but to decide on in between performance is very difficult task. Sometimes one has to give subjective judgment which again may create some problems. The study considered CAMEL ratio and stated that the ratio can minimise the potential risks which may lead to bank failure. It is understood from literature that CAMEL approach suffers from the limitations of subjectivity, indeterminacy and inconsistency. In order to overcome the limitations the present study aims at providing objectivity in the subjective judgment. FAHP approach provides the required objectivity in the subjective treatment of assigning weights to the CAMEL parameters to judge the ranking positions. The data validation of the model is carried our selecting Axis Bank Ltd. Bank of Baroda (BOB), Bank of India (BOI), Yes Bank, HDFC Bank Ltd (HDFC Bank), ICICI Bank Ltd (ICICI Bank), IDBI Bank Ltd (IDBI Bank),Union bank of India, Allahabad Bank, State Bank of India (SBI), Punjab National Bank (PNB),United Bank of India (UBI), Indian Overseas Bank (IOB), Central Bank of India, and Dena Bank. From the final list of overall ranking of banks it is observed that SBI's performance is highest, scoring 0.119516367 followed by IDBI Bank, scoring 0.089115461 and Central Bank's performance is lowest, scoring 0.032846188. User can get necessary information regarding the status of the banks by using this model. Further this model may be used for any other research work.

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