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Consistency in the Bond Rating Methodology – A Study of Indian Credit Rating Agencies

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Abstract

Credit rating is an alpha numeric symbol that provides the opinion about the safety and creditworthiness of an entity or an instrument. It gives a comprehensive picture of the risk associated with the financial instrument or the issuer, taking into consideration the past performances, present projects and future prospects. Credit rating agencies use both qualitative and quantitative data in analyzing and evaluating the creditworthiness of borrowers. Qualitative factors such as management of the company, age and size of the company, business profile, goodwill, strength of the brands, core competencies and such other factors are difficult to quantify for analysis. It is in this backdrop, the study attempts to use the quantitative elements (ratios) used by credit rating agencies as the key factors in assessing the internal and external consistency in bond rating methodology. The sample chosen for the study is 132 bonds rated by CRISIL, CARE, ICRA and INDIA RATINGS during the period 2008-09 to 2014-15. With the help of one way ANOVA and Tukey Honest Significant Difference analysis, the study highlights that the bond rating methodology within the group is consistent (variance is minimum) and across the group is also found to be consistent, which points at the failure of ratios used by CRAs in discriminating the different grades.

Keywords: Credit rating, External consistency, internal consistency, Quantitative factors, Bond rating methodology

JEL Classification: G14, G24, C12

Paper Classification: Research Paper

Introduction

Credit Rating Agencies (CRAs) emerged in the beginning of the twentieth century to resolve the problem of information asymmetry that exists between the Surplus Spending Units (SSUs) and Deficit Spending Units (DSUs). Diamond (1991) stated that when there is information asymmetry, the SSUs cannot successfully distinguish good borrowers from bad borrowers, and because of this, the investment decisions made by SSUs become inefficient (Stiglits and Weiss, 1981; Myers and Majluf; 1984). Thus, CRAs helped transmit information about the issuers or borrowers creditworthiness and their ability to make future payments to large number of information seekers. Smith and Walter (2001) opines that CRAs execute an important and helpful function

of assembling the creditworthiness information into RATING, which investors find it difficult to produce on their own.

Credit rating is an opinion about the safety and creditworthiness of an issuer or an instrument. It gives a comprehensive picture of the risk associated with the financial instrument or issuer, taking into consideration the past performances, present projects and future prospects. "A Credit Rating is an opinion about the creditworthiness of a borrower, or the creditworthiness of a particular financial instrument, which is given based on relevant risk factors" (Standard and Poor's, 2009). Moody defines Credit Rating to be "An opinion about the current and future ability of an issuer to make timely payments of principal and interest on a specific instrument. Credit rating provides a large variety of information that needs to be known about the creditworthiness of the issuer of bonds and certain other financial instruments. Indian credit rating agency CRISIL defines credit rating as follows: "Credit rating is an unbiased, objective and independent opinion of an issuer's capacity to meet both present and future financial obligation, it indicates the safety of timely payment of interest and principal on a particular debt instrument. Thus, rating can apply to a particular debt obligation of the company or to the company as a whole". Credit rating agencies (CRAs) provide the borrower's ability to repay the debt obligation (credit worthiness) information to investors thereby serving as information intermediary between lenders and borrowers. Thus, White (2001) says the CRAs help investors "penetrate the fog of asymmetric information".

The need for credit rating agencies was further enhanced with the dawn of globalization. Gras (2003) outlines the credit rating industry growth after 1960s to five important factors: structural changes in financial markets; creation of complex credit products (through securitisation); disintermediation shifted credit from banks to capital markets; increased financing of individual countries; and ratings based regulations. In addition to this, investors do not have timely access to similar information, and credit ratings represent one potential solution to the issue of asymmetric information (Ramakrishna & Thakor, 1984). Investors also do not have a thorough understanding and knowledge of a company. Hence, they rely on the ratings assigned by rating agencies for their investment decisions.

CRAs use both qualitative and quantitative data in analyzing and evaluating the creditworthiness of borrowers. Qualitative factors are difficult to quantify and hence in this study we use the quantitative elements (Ratios) used by credit rating agencies as the key factors in assessing the debenture rating methodology and its consistency within the groups (internal) and across the groups (external).

Review of Literature

CRAs analyze and evaluate the creditworthiness of issuers and their instruments by using both qualitative and quantitative data. Quantitative factors mainly financial ratios represent firm specific factors such as liquidity ratio, leverage ratio, profitability ratio, activity ratios as seen in the works of Ederington L (1985), Blume et al. (1998) and Kamstra et al. (2001). Corporate governance factors such as board independence, ownership structure are also considered while rating an entity (Bhojraj & Sengupta (2003) and Ashbaugh-Skaife et al. (2006)). Credit rating agencies proclaim that they also internalize qualitative factors such as management of the company, age and size of the company, business profile, goodwill, strength of the brands, core competencies while assigning a particular rating. A thorough and comprehensive consideration of all the above factors by CRAs should enable them to give an accurate and reliable rating. However, Credit rating agencies have come under serious criticism (for assigning inflated and

inaccurate ratings) after the collapse of big giants such as Enron, Worldcom, Lehman brothers, US subprime crisis to name a few.

Since then, the researchers and users of credit ratings across the globe have started questioning the quality of credit ratings by examining the ratings standards and their consistency. CRISIL rating standards are too liberal and lax in comparison with Standard and Poor international rating agency (Raghunathan and Varma, 1992). CRISIL also falls short of expectation even in terms of their internal consistency (Raghunathan and Varma, 1992). Arora, M (2000) identified eight ratios namely ROCE, OPM, operating profit to total profit, cash accrual, interest coverage, growth rate, current and solvency ratio as the key financial determinants of ratings. Using these determinants, Sehgal, S and Arora, M (2004) studied the consistency of bond rating methodology of CRISIL and ICRA. The findings of the study pointed at the weaknesses in the rating methodology adopted by them as the important financial factors fail to discriminate across the rating classes. Similarly, Kaur and Kaur (2011) assessed the internal consistency in rating methodology of CRISIL, CARE, ICRA and India Ratings by considering eight financial ratios (two liquidity ratios, two leverage ratios, and four profitability ratios) and found that rating agencies are consistent in assigning a particular rating grade with an exception to profit after tax ratio of AAA rated companies by CARE and quick ratio of AA rated companies by CRISIL as large difference was seen for these ratios. They also assessed the external consistency by taking companies belonging to different rating classes (between groups). The study revealed that all the four rating agencies had inconsistent rating methodology for assigning different rating grades. The key financial ratios of the sample companies belonging to different rating categories were not significantly different from each other. The only ratios which differed significantly includes return on net worth and PAT/TI ratio of companies rated by ICRA, PAT/TI and profit before depreciation and tax ratio of companies rated by CRISIL, and interest coverage ratio of companies rated by CARE.

Research Gap

The researchers' views on the role, importance and quality of credit rating are diametrically opposing. On one hand, the role and importance attached to credit rating agencies has increased since 1990's with liberalization, globalization and privatization. CRAs occupy an essential role in the worldwide system of capital allocation owing to disintermediation and globalization (Kerwer, 2004). They are the only actors in the modern international financial system to have access to assess the creditworthiness of substantial number of entities and instruments. CRAs have particular importance because their ratings are embedded or hardwired into investment mandates, global banking regulations and securities rules and regulations (Cantor R & Frank P, 1995). The role of CRAs as providers of opinion about the creditworthiness of issuers, instruments and countries has mounted high owing to accelerated growth in financial markets structured products. In addition to this, the demand for CRAs grew in geometric progression owing to Basel II which incorporated the credit ratings while assigning weights for credit risk. On the other hand, CRAs are criticized for enjoying great success for providing not so informational value to the investing public. Theoretically, if CRAs deliberately assign or uphold erroneous ratings, then, it should damage their reputation and in turn CRAs business would suffer. While, in reality, when thousands of structured financial obligations proved to hold inflated ratings during the crisis, CRAs continued to maintain their position in the financial system (Bonewitz, P.L, 2010). In this background, the ratings standards and their consistency are questioned. In many instances, the CRAs proved to be disastrous and did not warn the investors about the gradual deterioration of creditworthiness about the issuers they were rating, such as in the case of Enron, World com, more recently in the case of Lehman brothers, Satyam etc. Further, the investor community does not

have a thorough understanding and knowledge of a company and hence tend to depend on the ratings for their investment decisions. It is in this backdrop, the article attempts to identify the key quantitative variables considered by credit rating agencies for assigning a rating, examines the internal and external consistency in the bond rating methodology.

Contribution of the Study

The study adds something new to the empirical review, about the consistency of financial variables in the rating methodology of Indian CRAs. The study considers the ratings assigned by four major SEBI recognized credit rating agencies namely, CRISIL, CARE, ICRA and INDIA RATINGS India, during the years 2008-09 to 2014-15. The consistency is analysed for four rating grades i.e., AAA, AA, A and BBB.

Objectives of the Study

1. To identify the key financial ratios that go into the determination of credit rating
2. To assess the internal consistency (within the group) in the bond rating methodology of four major credit rating agencies
3. To assess the external consistency (between the group) of each credit rating agency for four rating grades

Hypothesis

1. The values of the key financial variables, of the select companies (sample) belonging to the same rating class/grade, should not be different from each other for all the rating agencies covered in the study (which implies the variance should be minimum, this highlights the internal consistency that exits). This confirms that rating methodology followed by each agency is consistent internally.

   H_0: There is no difference in the values of the nine important financial variables of select companies (sample) that belong to same grade/class of CRISIL, CARE, ICRA and INDIA RATINGS (Internal Consistency exists)

   H_1: There is a difference in the values of the nine important financial variables of select companies (sample) that belong to same grade/class of CRISIL, CARE, ICRA and INDIA RATINGS (Internal Consistency does not exists)

2. The key financial variables of select companies (sample) belonging to different rating grades/ classes should differ from each other for all the rating agencies covered in the study (Variance should be maximum, external inconsistency exists) which implies that the rating agencies have considered different values of the key financial ratios in assigning the credit rating, and hence these financial factors become the important discriminating factors in deciding the rating

   H_{02}: There is no difference in the values of the nine key financial variables of select companies (sample) that belong to different grade/class of CRISIL, CARE, ICRA and INDIA RATINGS

   H_2: There is a difference in the values of the nine key financial variables of select companies (sample) that belong to different grade/class of CRISIL, CARE, ICRA and INDIA RATINGS

Research Methodology

- **Scope and Period of study** : The bonds/debentures of the listed companies that are rated by four major CRAs namely CRISIL, CARE, ICRA and India Ratings, during the period 2008-09

to 2014-15. Further, Four rating grades i.e., AAA, AA, A and BBB is considered for the study based on the fact that most of the rated companies fall under these four categories.

- **Data Sources:** The data pertaining to the list of debentures with various grades were sourced from CRISIL ratings scan, CRISIL Annexures, CARE rating view, CARE monthly reports, ICRA rating profile, INDIA RATINGS India monthly rating reports and websites of the credit rating agencies. Further, the data relating to the key financial ratios are extracted from Ace equity financial database, Company annual reports, moneycontrol.com website.
- **Sample Size:** A total of 132 rated debentures are taken for the study, 36 rated by CRISIL, 36 rated by CARE and 36 rated by ICRA (9 from each of the four rating grades) and 24 companies rated by India Ratings (6 from each of the four rating grades).
- **Methodology:** The study identifies nine financial ratios as the key factors to achieve the objective. These factors have been selected based on the previous studies conducted and information from the rating agency websites. The financial ratios are good predictors of ratings which in turn measure the risk (Altman, 1968). In fact, all the credit rating agencies worldwide rely to a great extent on financial variables; however, they are not the only determinants of ratings. The major chunk of variability (75%) in the yield spreads and in ratings is explained by financial ratios (Ang, J.P & Patel, K 1975; Kaplan & Urwitz, 1979; Chandrasekhar & Vaikuntanath, 1994).

The rating consistency is assessed by taking the nine key financial ratios for four rating grades (AAA, AA, A and BBB), further these grades have been chosen based on the truth that greater part of the bonds rated fall under these categories.

Nine financial ratios (two liquidity ratios, two solvency ratios, and five profitability ratios) and their formulae are shown in the table 1. The ratios for the sample companies in the year the rating is assigned are noted and compared across sample companies. (Though the year of rating is different, the comparision is done on the assertion that the mean values of any given financial variable for a rating grade and across the rating grades does not differ over a short period of time) (Arora, M, 2003)

Table 1: Table showing the key financial ratios and their formulae

Sl. No	Type of Ratio	Ratio	Formulae
1.	Liquidity	Current Ratio	Current Assets/ Current Liabilities
2.	Liquidity	Quick Ratio	Liquid assets/ Current Liabilities
3.	Solvency	Debt Equity Ratio	Total Liabilities/Total Equity
4.	Solvency	Interest Coverage Ratio(Debt service coverage ratio)	PBIT/Fixed interest charges
5.	Profitability	Operating Profit Margin	Operating profit/Net sales
6.	Profitability	Return on Capital Employed (ROCE)	Profit before Interest and Taxes (PBIT) / Total Debt + Net Worth
7.	Profitability	Return on Net Worth (RONW)	Net Income/Shareholders Equity
8.	Profitability	EBIT Margin	Earnings before interest and tax/Total sales revenue
9.	Profitability	Cash Profit Margin	EBITDA/Sales

Statistical Tests:

a) Analysis of Variance (ANOVA) - F values using ANOVA are computed for all the four rating grades to assess the internal and external consistency in rating methodology of the four big

rating agencies. ANOVA is used to compare the means of two or more samples (different rating grades) at a time. F value determination is shown in table 2.

Table 2: Table showing the steps to compute one way ANOVA

Sources of Variation	Sum of Squares (SS)	Degree of Freedom (d.f)	Mean Squares (MS)	F Value
Between Samples	SS Between	k – 1	MS Between = SS Between/k-1	F = MS Between/MS Within
Within Samples	SS Within	n- k	MS Within = SS Within/n-k	
Total	SS Total	n – 1		

If the p values obtained are less than 5 percent, then the means of the samples are significantly different (F values are significant).

b) Tukey Honest Significant Difference – Further, in case where the F values are significant, it is more important to know which groups in the samples differ, and in order to ascertain which groups in the sample differ, Tukey's Honest Significant Difference (HSD) test is used which is given by

$$q_s = \frac{Y_A - Y_B}{SE},$$

Where Y_A and Y_B represent the larger and the smaller of the two means being compared respectively, and SE is the standard error of the data. The two means are said to be significantly different, if the calculated Q_s is greater than the Q critical (table) value obtained from the distribution.

Data Interpretation and Analysis

Within The Group Consistency in Rating Methodology (Internal Consistency)

Table 3: Table showing the comparison of AAA rated companies

Sl.No	Financial Variable	CRISIL		CARE		ICRA		INDIA RATINGS	
		F Values	Sig	F Values	Sig	F Values	Sig	F Values	Sig
1	Current Ratio	0.1142	0.8939	0.5081	0.6254	1.3688	0.3238	0.7105	0.559
2	Quick Ratio	0.8781	0.4629	0.6311	0.564	2.2831	0.1831	0.712	0.5584
3	Debt Equity Ratio	1.0506	0.4063	0.5475	0.6048	1.3025	0.339	0.2941	0.7645
4	Interest Coverage Ratio	29.939	0.0008*	1.4436	0.3077	1.958	0.2215	0.6565	0.5801
5	Operating Profit Margin	0.6617	0.5499	0.3082	0.7458	0.6732	0.5448	0.916	0.4892
6	Return on capital employed	1.209	0.3621	2.7751	0.1402	1.2195	0.3594	0.7064	0.5606
7	Return on net worth	0.9324	0.444	2.2815	0.1833	1.6573	0.2673	1.4058	0.3709
8	Earnings before interest and tax margin	0.7407	0.5158	0.2389	0.7946	0.9859	0.4264	0.336	0.7385
9	Cash Profit Margin	0.1149	0.8934	0.0405	0.9605	0.394	0.6906	3.6644	0.1565

**Significant at 5% level*

Table 3 displays the F values of AAA companies. The companies rated by CRISIL had more or less similar values of eight financial ratios except interest coverage ratio where F value is significant, which brings us to the point that companies that are rated AAA by CRISIL may have significantly different interest coverage values, while all the other ratios had similar values. In

addition to that, the table emphasize that the F-values of all the nine ratios of AAA companies are insignificant, which implies that the values of the nine ratios are closely associated and can be understood that the rating methodology followed by CARE, ICRA and INDIA RATINGS is consistent in assigning AAA rating grade during the period of study.

Table 4: Table showing the comparison of AA rated companies

Sl.No	Financial Variable	CRISIL		CARE		ICRA		INDIA RATINGS	
		F Values	Sig	F Values	Sig	F Values	Sig	F Values	Sig
1	Current Ratio	0.1332	0.8778	1.4367	0.3092	1.3739	0.3227	0.1885	0.8373
2	Quick Ratio	3.4384	0.1012	1.2298	0.3568	0.4458	0.6599	0.0754	0.9291
3	Debt Equity Ratio	0.8868	0.4598	0.279	0.7658	0.3218	0.7366	0.4841	0.6573
4	Interest Coverage Ratio	0.9336	0.4436	0.1302	0.8803	1.1298	0.3833	1.0137	0.461
5	Operating Profit Margin	0.0159	0.9843	2.0225	0.2131	1.8386	0.2383	0.2676	0.7817
6	Return on capital employed	1.7445	0.2528	3.0227	0.1236	1.0066	0.4198	0.7064	0.5606
7	Return on net worth	1.4634	0.3036	3.6138	0.0933	0.027	0.9734	1.4058	0.3709
8	Earnings before interest and tax margin	0.2695	0.7726	6.8949	0.0279*	0.288	0.7596	0.1807	0.8431
9	Cash Profit Margin	0.6113	0.5733	0.9804	0.4281	8.7405	0.0167*	10.579	0.0438*

**Significant at 5% level*

The F values of companies that were rated AA by CRISIL, CARE, ICRA and INDIA RATINGS are given in Table 4. It is evident from the table that the companies rated by CRISIL had more or less similar values for each of the nine financial ratios as their F values are insignificant, which brings us to the note that CRISIL is consistent while assigning AA grade.

However, the companies rated AA by CARE had a significant F value of EBIT margin, companies rated AA by ICRA and INDIA RATINGS had a significant F value of cash profit margin, which means that the companies had significantly differing values of EBIT margin in case of CARE AA rated entities and cash profit margin in case of ICRA and INDIA RATINGS AA rated entities, while all the other ratios had similar values during the study period.

Table 5: Table showing the comparison of A rated companies

Sl.No	Financial Variable	CRISIL		CARE		ICRA		INDIA RATINGS	
		F Values	Sig	F Values	Sig	F Values	Sig	F Values	Sig
1	Current Ratio	0.9162	0.4496	0.4899	0.6352	0.4042	0.6844	0.601	0.6033
2	Quick Ratio	0.9256	0.4463	1.4275	0.3111	0.8073	0.4892	0.2707	0.7797
3	Debt Equity Ratio	0.0099	0.9902	0.1954	0.8275	7.6481	0.0224*	1.2551	0.4017
4	Interest Coverage Ratio	0.8684	0.4664	1.7656	0.2495	3.0851	0.1198	1.941	0.2878
5	Operating Profit Margin	0.4657	0.6486	0.1044	0.9025	1.1046	0.3904	0.3299	0.7422
6	Return on capital employed	6.1152	0.0357*	0.2488	0.7874	1.9976	0.2163	29.379	0.0107*
7	Return on net worth	1.4418	0.3081	3.1504	0.1161	1.7776	0.2476	38.014	0.0074*
8	Earnings before interest and tax margin	0.3149	0.7412	0.3449	0.7215	1.5138	0.2936	0.1764	0.8464
9	Cash Profit Margin	0.7544	0.5102	0.0508	0.9508	0.9904	0.4249	0.0535	0.9488

**Significant at 5% level*

A quick perusal of Table 5 shows the F values of companies that were rated A by CRISIL, CARE, ICRA and INDIA RATINGS. It is apparent from the table that the companies rated by CRISIL had more or less similar values of eight financial ratios except return on capital employed where F value is significant, which explains that companies that are rated A by CRISIL may have significantly different ROCE values, while all the other ratios had similar values. Similarly, ICRA rated companies had a significant F value for debt equity ratio and INDIA RATINGS rated companies had a significant F value for return on capital employed and return on net worth ratios, which indicates that the rating agencies might have considered different values of debt equity ratio in case of ICRA and different values of ROCE and RONW in case of INDIA RATINGS while assigning A grade, while all the other ratios had similar values. Further the table also highlights that the F-values for all the ratios rated by CARE have insignificant f values, which signals that the rating methodology adopted by CARE while assigning A rating is consistent during the period of the study.

Table 6: Table showing the comparison of BBB rated companies

Sl.No	Financial Variable	CRISIL		CARE		ICRA		INDIA RATINGS	
		F Values	Sig	F Values	Sig	F Values	Sig	F Values	Sig
1	Current Ratio	0.9415	0.4409	2.5901	0.1546	0.36	0.7118	0.7866	0.5313
2	Quick Ratio	1.4515	0.3061	0.3093	0.745	1.9578	0.2216	2.2092	0.2572
3	Debt Equity Ratio	2.0561	0.2089	0.2756	0.7682	0.2691	0.7728	0.9485	0.4795
4	Interest Coverage Ratio	1.3684	0.3239	1.2245	0.3581	0.951	0.4378	0.9631	0.4752
5	Operating Profit Margin	9.6934	0.0132*	2.6133	0.1527	0.0987	0.9075	2.0033	0.2802
6	Return on capital employed	1.9595	0.2213	0.0458	0.9555	1.0814	0.3971	4.8635	0.1144
7	Return on net worth	1.0943	0.3934	0.222	0.8072	0.5151	0.6217	38.014	0.0074*
8	Earnings before interest and tax margin	4.6215	0.061	3.5328	0.0968	0.1639	0.8525	0.1764	0.8464
9	Cash Profit Margin	7.7207	0.0219*	1.1494	0.3779	0.201	0.8232	1.4088	0.3703

**Significant at 5% level*

The F values of companies that were rated BBB grad by CRISIL, CARE, ICRA and INDIA RATINGS are given in Table 6. It is clear from the tables, CRISIL rated companies had more or less similar values of seven financial ratios but for operating profit and cash profit where F value is significant, which explains that companies that are rated BBB by CRISIL may have significantly different OPM and cash profit margin values. Similarly, INDIA RATINGS rated companies had a significant F value only for return on net worth which indicates that the rating agency might have considered different values of RONW, while all the other ratios had similar values.

Further the table also highlights that the F-values of all companies rated BBB by ICRA and CARE have insignificant f values, which highlights that the rating methodology adopted by CARE and ICRA in assigning BBB grade is consistent during the period of study.

Across The Group Consistency in Rating Methodology (External Consistency)

Comparison of Current Ratio of Different Rating Classes of All Agencies

Table 7: Table showing the mean values of current ratio of different rating classes

RATING CLASS	CRISIL	CARE	ICRA	INDIA RATINGS
AAA	1.36	1.7022	1.48	2.736
AA	1.1878	3.2289	1.1722	1.615
A	0.93	1.2367	0.94	1.453
BBB	0.9289	1.4467	1.1644	1.19
F Value	2.145275	0.823072	1.520523	1.10417
Combination	**Tukey HSD - Significance of Mean Difference**			
AAA Vs AA	1.1959	1.5325	1.7112	1.7295
AAA Vs A	2.9859	0.4673	3.0023	1.9787
AAA Vs BBB	2.9936	0.2565	1.7544	2.3848
AA Vs A	1.7900	1.9998	1.2911	0.2493
AA Vs BBB	1.7977	1.7890	0.0432	0.6553
A Vs BBB	0.0077	0.2108	1.2479	0.4060

The current ratios of companies that were assigned AAA, AA, A and BBB grade by four CRAs are shown in table 7. It is apparent from the displayed table that the F values are insignificant for all the four rating agencies, which implies that the companies rated AAA, AA, A and BBB by each of the four rating agencies individually have similar values of current ratio, which indicates that the rating agencies have not considered current ratio as a serious factor in assigning rating grades.

Table 8: Table showing the mean values of quick ratio of different rating classes

RATING CLASS	CRISIL	CARE	ICRA	INDIA RATINGS
AAA	1.24	1.9733	1.4867	6.208
AA	1.4467	3.3978	1.1178	2.225
A	1.755	2.4445	1.0622	1.286
BBB	1.844	1.8556	1.0989	1.68
F Value	0.536916	0.457889	1.420602	1.361587
	Tukey HSD - Significance of Mean Difference			
AAA Vs AA	0.5424	1.3188	2.2184	2.0461
AAA Vs A	1.3531	0.0195	2.5524	2.5280
AAA Vs BBB	1.5864	0.1090	2.3319	2.3260
AA Vs A	0.8107	1.2992	0.3341	0.4820
AA Vs BBB	1.0440	1.4278	0.1136	0.2799
A Vs BBB	0.2333	0.1286	0.2205	0.2020

Table 8 displays the quick ratios of companies that were assigned AAA, AA, A and BBB grade by four rating agencies. It is clearly evident that the F values are insignificant for all the four rating agencies; this implies that the companies rated AAA, AA, A and BBB by each of the four rating agencies individually have similar values of quick ratio, which indicates that the rating agencies have not considered quick ratio either as a serious factor in assigning rating grades.

Table 9: Table showing the mean values of debt equity ratio of different rating classes

RATING CLASS	CRISIL	CARE	ICRA	INDIA RATINGS
AAA	0.7867	0.3122	2.4311	2.5
AA	0.6744	0.38	0.8555	2.771
A	1.07	0.7678	1.2356	0.933
BBB	0.8944	1.6622	1.06	0.873
F Value	0.280032	1.010759	9.603266*	2.768769
Combination	**Tukey HSD - Significance of Mean Difference**			
AAA Vs AA	0.3527	2.2385	0.3382	0.4490
AAA Vs A	0.8905	1.6986	2.2730	2.5896
AAA Vs BBB	0.3387	1.9480	6.7357**	2.6887
AA Vs A	1.2432	0.5399	1.9348	3.0386
AA Vs BBB	0.6915	0.2905	6.3976**	3.1378
A Vs BBB	0.5518	0.2494	4.4628*	0.0992

**Significant at 5% level, ** Significant at 1%*

The F values pertaining to debt equity ratios of companies that were assigned AAA, AA, A and BBB grade by four rating agencies are shown in table 9. The table exhibits insignificant F values for three rating agencies CRISIL, CARE and INDIA RATINGS, which implies that these rating agencies have considered similar debt equity values over the study period which shows the inconsistency in rating methodology adopted by them. While, ICRA is the only rating agency that has a significant F value, which indicates that ICRA considers different debt equity values while assigning different rating grades, the difference is prominent in AAA and BBB, AA and BBB, A and BBB as highlighted by Tukey's HSD test.

Table 10: Table showing the mean values of interest coverage ratio of different rating classes

RATING CLASS	CRISIL	CARE	ICRA	INDIA RATINGS
AAA	21.5622	10.6189	256.125	4.86
AA	10.9544	5.6889	29.6167	2.28
A	5.2444	4.0889	11.156	10.586
BBB	2.4722	2.5456	17.1	3.996
F Value	3.444781*	0.963929	2.447072	1.005151
Combination	**Tukey HSD - Significance of Mean Difference**			
AAA Vs AA	2.3318	1.3832	2.7478	0.7184
AAA Vs A	3.5870	1.8321	3.3675	1.5946
AAA Vs BBB	4.1964*	2.2651	3.1680	0.2404
AA Vs A	1.2552	0.4489	0.6387	2.3130
AA Vs BBB	1.8646	0.8819	0.4331	0.4780
A Vs BBB	0.6094	0.4330	0.2057	1.8350

**Significant at 5% level*

Table 10 exhibits the F values pertaining to interest coverage ratios of companies that were assigned AAA, AA, A and BBB grade by four rating agencies. The table exhibits insignificant F values for three rating agencies CARE, ICRA and INDIA RATINGS, which implies that these rating agencies have considered similar interest coverage values over the study period which

shows the inconsistency in rating methodology adopted by them. While, CRISIL is the only rating agency that has a significant F value, which indicates that CRISIL considers different interest coverage values while assigning different rating grades, the difference is prominent in AAA and BBB as highlighted by Tukey's HSD test.

Table 11: Table showing the mean values of OPM ratio of different rating classes

RATING CLASS	CRISIL	CARE	ICRA	INDIA RATINGS
AAA	23.5967	30.2989	36.9122	51.951
AA	10.5667	14.3367	17.0678	44.106
A	12.5611	32.0356	16.0711	34.993
BBB	15.1433	52.4356	14.5611	18.475
F Value	1.114874	1.795751	8.642074*	1.604219
	Tukey HSD - Significance of Mean Difference			
AAA Vs AA	2.4007	1.6685	5.5262**	0.6908
AAA Vs A	2.0332	0.1815	5.8038**	1.4933
AAA Vs BBB	1.5044	1.6043	6.2243**	2.9478
AA Vs A	0.3675	1.8501	0.2775	0.8025
AA Vs BBB	0.8962	3.2728	0.6980	2.2570
A Vs BBB	0.5288	1.4228	0.4205	1.4545

**Significant at 5% level, ** Significant at 1%*

The F values relating to operating profit margin ratios of companies that were assigned AAA, AA, A and BBB grade by four rating agencies are shown in table 11. The table exhibits insignificant F values for three rating agencies CRISIL, CARE and INDIA RATINGS, which implies that these rating agencies have considered similar operating profit margin values over the study period which shows the inconsistency in rating methodology adopted by them. While, ICRA is the only rating agency that has a significant F value, which indicates that ICRA considers different operating profit margin values while assigning different rating grades, the difference is prominent in AAA and AA, AAA and A, AAA and BBB as highlighted by Tukey's HSD test.

Table 12: Table showing the mean values of ROCE ratio of different rating classes

RATING CLASS	CRISIL	CARE	ICRA	**INDIA RATINGS**
AAA	24.0756	12.9833	26.9044	10.71
AA	15.0944	8.4144	24.5767	11.301
A	12.9867	10.3944	21.0733	21.943
BBB	12.4456	9.6911	13.0289	13.13
F Value	2.41435	0.740957	1.562816	2.400296
Combination	**Tukey HSD - Significance of Mean Difference**			
AAA Vs AA	2.5816	2.0432	0.4793	0.1757
AAA Vs A	3.1875	1.1577	1.2007	3.3359
AAA Vs BBB	3.3431	1.4723	2.8572	0.7201
AA Vs A	0.6059	0.8854	0.7214	3.1602
AA Vs BBB	0.7614	0.5709	2.3779	0.5444
A Vs BBB	0.1555	0.3145	1.6565	2.6158

**Significant at 5% level, ** Significant at 1%*

Table 12 presents the return on capital employed of companies that were assigned AAA, AA, A and BBB grade by four CRAs. It is apparent that the F values are insignificant for all the four rating agencies, which implies that the companies rated AAA, AA, A and BBB by each of the four rating agencies individually have similar values of ROCE, which indicates that the rating agencies have not considered ROCE as a serious factor in assigning rating grades.

Table 13: Table showing the mean values of RONW of different rating classes

RATING CLASS	CRISIL	CARE	ICRA	INDIA RATINGS
AAA	20.3233	12.8122	23.9778	12.42
AA	15.51	8.4022	25.411	10.405
A	13.2789	10.4844	18.0667	18.243
BBB	9.3689	7.3022	15.944	10.815
F Value	2.154451	0.901998	1.60424	1.100074
Combination	**Tukey HSD - Significance of Mean Difference**			
AAA Vs AA	1.5455	1.7231	0.3981	0.5837
AAA Vs A	2.2619	0.9095	1.6416	1.6868
AAA Vs BBB	3.5173	2.1529	2.2310	0.4649
AA Vs A	0.7164	0.8136	2.0397	2.2705
AA Vs BBB	1.9718	0.4298	2.6291	0.1188
A Vs BBB	1.2554	1.2434	0.5894	2.1517

The return on net worth of companies that were assigned AAA, AA, A and BBB grade by four CRAs are given in Table 13. It is apparent that the F values are insignificant for all the four rating agencies, which implies that the companies rated AAA, AA, A and BBB by each of the four rating agencies individually have similar values of RONW, which indicates that the rating agencies have not considered RONW as a serious factor in assigning rating grades.

Table 14: Table showing the mean values of EBIT ratio of different rating classes

RATING CLASS	CRISIL	CARE	ICRA	INDIA RATINGS
AAA	20.3244	25.2067	27.8522	45.913
AA	6.3533	8.57	13.2056	40.541
A	9.4622	23.7211	12.1656	27.793
BBB	10.6022	45.86	11.3678	13.683
F Value	1.288755	2.715961*	8.319423*	1.792769
Combination	**Tukey HSD - Significance of Mean Difference**			
AAA Vs AA	2.6291	1.7899	5.3891**	0.5004
AAA Vs A	2.0441	0.1598	5.7718**	1.6880
AAA Vs BBB	1.8295	2.2220	6.0653**	3.0025
AA Vs A	0.5850	1.6300	0.3827	1.1876
AA Vs BBB	0.7996	4.0119*	0.6762	2.5021
A Vs BBB	0.2145	2.3818	0.2935	1.3145

**Significant at 5% level, ** Significant at 1%*

Table 14 presents the F values relating to EBIT margin ratios of companies that were assigned AAA, AA, A and BBB grade by four rating agencies. The table exhibits insignificant F values for two rating agencies CRISIL and INDIA RATINGS, which implies that these rating agencies have

considered similar EBIT margin values over the study period which shows the inconsistency in rating methodology adopted by them. While, CARE and ICRA rating agencies have a significant F value, which indicates that both these agencies considered different EBIT margin values while assigning different rating grades, the difference is prominent in AA vs BBB in case of CARE and AAA and AA, AAA and A, AAA and BBB in case of ICRA as highlighted by Tukey's HSD test.

Table 15: Table showing the mean values of CPM ratio of different rating classes

RATING CLASS	CRISIL	CARE	ICRA	INDIA RATINGS
AAA	13.0166	9.7667	27.6056	20.593
AA	12.4322	13.8844	16.0378	13.46
A	10.2144	19.3511	11.6878	17.53
BBB	9.3667	20.9722	9.5278	10.968
F Value	0.523189	0.867946	8.505641*	0.972666
Combination	**Tukey HSD - Significance of Mean Difference**			
AAA Vs AA	0.2422	0.8143	4.1846*	1.6476
AAA Vs A	1.1614	1.3590	5.7582**	0.7068
AAA Vs BBB	1.5127	2.2159	6.5396**	2.2231
AA Vs A	0.9191	0.5447	1.5736	0.9408
AA Vs BBB	1.2705	1.4016	2.3550	0.5755
A Vs BBB	0.3514	0.8569	0.7814	1.5163

**Significant at 5% level, ** Significant at 1%*

The F values relating to cash profit margin ratios of companies that were assigned AAA, AA, A and BBB grade by four rating agencies are shown in table 15. The table exhibits insignificant F values for three rating agencies CRISIL, CARE and INDIA RATINGS, which implies that these rating agencies have considered similar cash profit margin values over the study period which shows the inconsistency in rating methodology adopted by them. While, ICRA is the only rating agency that has a significant F value, which indicates that ICRA considers different cash profit margin values while assigning different rating grades, the difference is prominent in AAA and AA, AAA and A, AAA and BBB as highlighted by Tukey's HSD test.

Discussion

It is seen from the above analysis that in case of internal consistency there is a considerable variation in the F values (ANOVA) of few of the financial variables namely interest coverage ratio of AAA rated companies by CRISIL, EBIT margin of CARE AA rated companies, cash profit margin of AA rated companies by ICRA and INDIA RATINGS, return on capital employed of A rated companies by CRISIL and INDIA RATINGS, debt equity ratio of A rated companies by ICRA and return on net worth of A rated companies by INDIA RATINGS, operating profit margin and cash profit margin of BBB rated companies by CRISIL and return on net worth of BBB rated companies by INDIA RATINGS. Hence, it can be understood that internal consistency is maximum for AAA rated companies and more so in case of CARE, ICRA and INDIA RATINGS; consistency in AA rated companies is found more in CRISIL, and then in CARE, ICRA and INDIA RATINGS; consistency in A rated companies is more in CARE and next by CRISIL, ICRA and INDIA RATINGS; consistency in BBB rated companies is maximum for CARE and ICRA, followed by INDIA RATINGS and CRISIL.Hence, the null hypothesis (H_0) stands accepted which has positive implications and means that the methodology followed by each of the credit rating

agencies in assigning grades is internally consistent. Our results are consistent with that of Kaur and Kaur (2011); Arora, M (2003).

The analysis in case of external consistency reveal that majority of the financial ratios had insignificant F values for all the four credit rating agencies, which implies that there is consistency in the rating methodology, indicating that the rating agencies considered similar values of ratios for assigning different grades i.e., AAA, AA, A and BBB. However, there are a few ratios that reported significant F values namely, debt equity ratio, operating profit margin, EBIT ratio and cash profit margin of companies rated by ICRA, interest coverage ratio of companies rated by CRISIL, EBIT ratio of companies rated by CARE. Hence, we conclude that the null hypothesis (H_{02}) is accepted which bears negative implications on the rating methodology adopted by CRAs; it highlights the failure of the key financial factors in differentiating the rating grades. Our results are in line with the results of Raghunathan and Verma (1992); Kaur and Kaur (2011); Arora, M (2003).

Research Implications, Limitations of the Study and Directions for Future Research

The chief objective of this research paper is to find out the prominent quantitative variables that go into the determination of a credit rating, and to examine the internal and external consistency of the bond rating methodology for the four rating grades (AAA, AA, A and BBB) using the nine ratios identified as important. The study employs ANOVA and Tukey HSD test to find out the consistency levels.

The study can be extended to include other rating grades such as BB, B, C and D. Further, the researchers can also incorporate certain important corporate governance variables and macro economic factors. Researchers can also focus on assessing the rating consistency of other rated financial instruments such as bank loans, stocks, short term securities etc. The data can also be analysed using one way ANOVA clubbed with Scheffe, Bonferroni and Holm multiple comparison.

Conclusion

It is seen from the analysis that in case of internal consistency considerable difference is found in the F values (ANOVA) of few of the financial ratios namely interest coverage ratio of AAA rated companies by CRISIL, EBIT margin of CARE AA rated companies, cash profit margin of entities rated AA by ICRA and INDIA RATINGS, return on capital employed of A rated companies by CRISIL and INDIA RATINGS, debt equity ratio of A rated companies by ICRA and return on net worth of A rated companies by INDIA RATINGS, operating profit margin and cash profit margin of BBB rated companies by CRISIL and return on net worth of BBB rated companies by INDIA RATINGS.

Hence, it can be understood that internal consistency is maximum for AAA rated companies and more so in case of CARE, ICRA and INDIA RATINGS; consistency in AA rated companies is found more in CRISIL, and next in CARE, ICRA and INDIA RATINGS; consistency in A rated companies is more in CARE, and next in CRISIL, ICRA and INDIA RATINGS; consistency in BBB rated companies is maximum for CARE and ICRA, followed by INDIA RATINGS and CRISIL.

The analysis in case of external consistency reveal that majority of the financial ratios had insignificant F values indicating that the rating agencies considered similar values of ratios for assigning different grades i.e., AAA, AA, A and BBB, which implies that there is a difference in the rating methodology implemented by all the four CRAs. However, there are a few ratios that reported significant F values namely, debt equity ratio, operating profit margin, EBIT ratio, cash

profit margin of companies rated by ICRA, interest coverage ratio of companies rated by CRISIL, EBIT ratio of companies rated by CARE. Our results are in line with the results of Raghunathan and Verma (1992); Kaur and Kaur (2011); Arora, M (2003).

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