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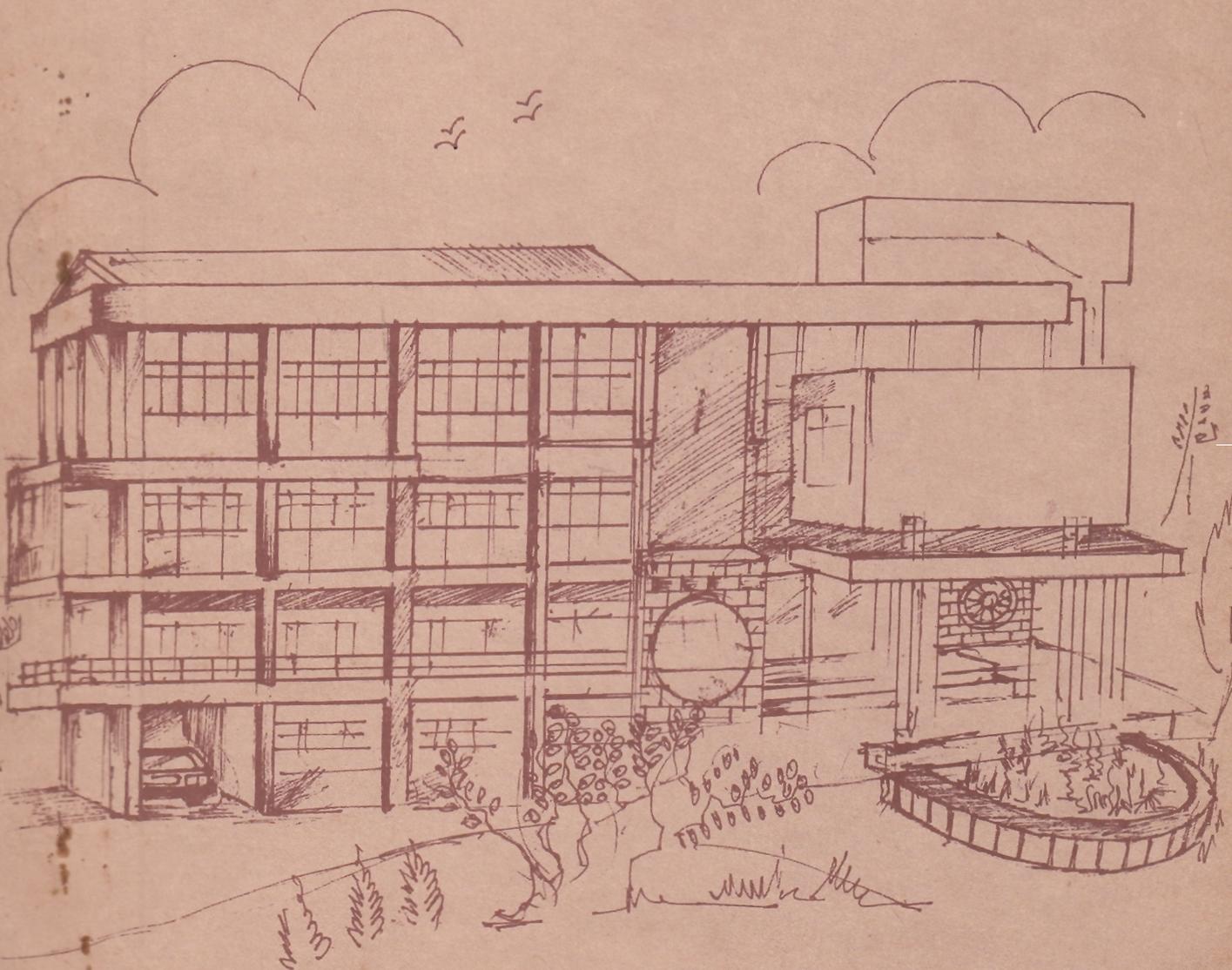
TAPMI

No. 3

Working Paper Series

CREDIT RATING: HOW TO ENSURE
CONSISTENCY

Dr. M. Obaidullah
and
Prof. R.S. Desikan*





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CREDIT RATING: HOW TO ENSURE CONSISTENCY

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ABSTRACT

Credit rating is a complex process involving a wide range of qualitative and quantitative parameters. It requires much more than just looking at financial ratios which are only proxy indicators for some of the characteristics of a firm's performance. Credit rating and rating of financial instruments in India are practices still in their evolutionary stages. Against this background, this article proposes a model, based on Analytic Hierarchy Process (AHP) for rating of debentures for use by CRISIL. The model is internally consistent and should enable CRISIL to streamline and standardise the overall rating procedure.

CREDIT RATING: HOW TO ENSURE CONSISTENCY

I. INTRODUCTION

A major risk that every investor in fixed-income securities faces is the risk of default. The primary objective of credit rating is to provide an indicator of such risk on any particular instrument. This useful service is provided by independent agencies in all major financial markets. In India, the Credit Rating Information Services of India Limited (CRISIL) has been in operation since 1988 and its ratings are widely believed to serve as useful guides to investment decision making.

In a study that has generated considerable interest among academicians and practitioners, Raghunathan & Varma (1) attempt to assess the quality of the credit rating function being performed by CRISIL. The study compares CRISIL's standards of rating with international (Standard & Poor's) standards. The comparison is undertaken with respect to ten financial ratios; the actual ratios for four Indian companies are compared against the median values for such ratios in different Standard & Poor (S & P) categories. The study concludes that "...CRISIL's ratings are far too liberal by international standards". The second major conclusion of the study is, however, much more alarming. The study finds, "...very little internal consistency in the CRISIL ratings... the wide divergence in credit worthiness among CRISIL's AAA companies is such as to rob the rating of

much of its meaning".

As far as the first shortcoming in CRISIL rating is concerned, it is probably of not much consequence for Indian investors. CRISIL ratings would continue to serve as useful guides on the relative riskiness of debentures for the Indian investors as long as the same "liberal" standards are applied consistently to all debentures. What is of utmost significance is "consistency" in ratings and therefore, the second finding of the study has serious implications.

In the present paper, we take a closer look at this possible major flaw in CRISIL ratings. Section II briefly analyses the rating criteria used by CRISIL and re-examines the basis for concluding that CRISIL ratings are inconsistent. In section III we present a model based on Analytic Hierarchy Process (AHP) using the same criteria for rating debentures as are currently being used by CRISIL. Section IV presents a case and a summary.

II THE POSSIBILITY OF INCONSISTENCY

An analysis of the criteria used by CRISIL for rating debentures reveals that the process includes a wide range of factors which involve an assessment of more than just "hard data". Some factors are quantitative, such as, the financial ratios while a majority are qualitative & judgmental in nature. The factors are briefly discussed below.

Rating of debentures of manufacturing companies involves two kinds of risk analysis: (i) Business risk analysis (BRA) and (2) Financial risk analysis (FRA). Each of these involves several specific criteria. Business risk analysis includes (1.a) industry risk analysis (IR), (1.b) assessment of market position (MP), (1.c) evaluation of operating efficiency of the company (OE), and (1.d) management evaluation (ME). The criteria for financial risk analysis are, (2.a) accounting quality (AQ), (2.b) earnings protection (EP), (2.c) adequacy of cash flow (ACF), and (2.d) financial flexibility (FF). Each of these above factors are again evaluated by assessing several other parameters by raising specific related questions and trying to find answers from the firm's performance (projected or known). It may be noted that only three out of the above eight criteria (2.b, 2.c & 2.d) involve financial analysis using ratios. The rest are more judgemental in nature. Hence, any attempt to rate the 'rating' process based only on 'financial ratios' as in the above mentioned study, may lead to an erroneous conclusion of inconsistency. No wonder, the AAA companies be placed in different categories, when the evaluation is done by considering financial ratios only.

While there is no reason to conclude, based on a mere comparison of financial ratios of the four sampled companies, that CRISIL's ratings are inconsistent, there is every reason to guard against this possibility. The possibility arises

out of judgemental inferences being an important part of the rating process. A systematic consideration of the qualitative & judgemental factors is a must in order to eliminate the possibility of inconsistencies - both longitudinal & cross sectional. The former occurs when the rating of a company is altered even when the company has not changed significantly enough to warrant this. The latter refers to the situation where the ratings of various companies at a given point in time do not correspond to their relative riskiness.

Since rating process at CRISIL involves several individuals, teams & committees spreading over a length of time, possibility of internal inconsistency does exist if the judgemental inferences of various experts are not combined in a consistent manner. A systematic methodology or a model which will take care of internal inconsistency would be of practical use for CRISIL's rating purpose. We describe a model using AHP for this purpose in the following section.

III. MODEL FORMULATION

The suggested model is based on the Analytic Hierarchy Process (AHP), a multi criteria decision making method which is developed by Saaty (2,3). It allows decision makers to visually structure any complex problem into a hierarchy of atleast two levels viz., 'attributes' (on which the alternatives are evaluated) and "alternatives" (products, courses of action, etc.). The method then focuses on

determining weights (or priorities) of a set of elements on the same level of hierarchy with respect to each of the elements in one level just above. (This is done by pairwise comparison and getting the eigenvector of resultant matrix). By repeating this process level by level the resultant matrices can be multiplied to arrive at priorities of the alternatives at the lowest level. For more details, readers can refer Saaty's book on AHP (3).

Since its introduction the AHP has been widely applied in a variety of areas ranging from energy policies, nuclear plant location to performance measurement. Though the AHP is useful in ranking alternatives, its extension to planning and resource allocation decisions may have its greatest utility. The survey article by Zahedi (4) succinctly give the methodology and diverse applications of AHP.

Using AHP for rating of debentures by CRISIL involves the following four steps:

1. Setting up the decision hierarchy;
2. Comparison of decision elements pairwise, level by level;
3. Estimating the relative weights of decision elements and
4. Aggregating these weights to arrive at final rankings.

Step 1 : Setting up decision hierarchy

This is based on the description of the rating process followed by CRISIL. For our AHP model, as depicted by Figure 1, the decision hierarchy consists of five levels. Level 1 refers to the overall decision problem of rating of debentures. Level 2 shows the first breakup of the decision problem into the two major decision elements - business risk analysis (BRA) and financial risk analysis (FRA). Each of these involves consideration of four criteria as noted in section II. These criteria are contained in level 3 of the hierarchy. Each of these criteria are assessed through a wide set of subcriteria which form the level 4 of the hierarchy. These subcriteria are not presented in the figure to retain visual clarity. We discuss these subcriteria below and present these portions of the overall hierarchy separately. The last level, level 5 contains eight rating alternatives.

Industry risk assessment (IR) involves examining the industry's leadership position & strength within the economy. The subfactors assessed are: business cyclicalilty (BC) or seasonality which involves consideration of the volatility & predictability of earnings; nature and basis of competition (NC); vulnerability of industry to government policies & regulation (GP); vulnerability to product obsolescence (PO); barriers to entry & exit policies (EE); supply factors, such as, availability of raw material & labour, import dependence,

fluctuations in input prices and existence of excess or sufficient plant capacity with respect to demand (SF); and basic financial characteristic of the industry, that is, how capital intensive & working capital intensive the industry is (FC). The industry risk assessment hierarchy is presented in Figure 2.

The assessment of market position of the company involves the following subcriteria: market share of the company, its history & projected ability to continue in that position (MS); distribution & marketing network and their positive & negative aspects at the regional, national & international levels (DMN); product ranges or diversity as a measure of firm's marketing flexibility and the potential for substitutes or obsolescence (PR); and customer base, including the company's relationship to its customers, concentration of sales among customers etc. (CB). The market position hierarchy is presented in Figure 3.

In evaluating the operating efficiency of the company, it is important to look at its historical operating margins. The ability to sustain or improve margins based on pricing or cost advantages (ASIM) is a major subcriterion. Locational advantages (LA) is another factor which may result in higher operating efficiency, for instance, being close to the source of major raw materials may result in lower cost. In some industries production efficiency (PE) is a key success factor. Other important considerations in evaluating the

operating efficiency of the company are: the wage scales or cost of labour employed (CL); energy costs (EC); and requirements of pollution control & existing facilities in this regard (PC). Figure 4 presents the operating efficiency hierarchy.

The management of the company determines to a large extent the future prospects of the company. Assessment of management is done primarily by looking at its past performance (PF) and financial policies (FP). Other considerations are : the goals, philosophies & strategies of the management (GPS); the depth of managerial talent & capability, especially to combat adverse situation (DC). The organisations structure (OS) is also an important consideration. The dependence on a single individual at CEO level, delegation of authority are look into. Another consideration is whether the company has a family based management or it is managed by professionals (FLP). With these subcriteria, the management evaluation hierarchy has a form as in Figure 5.

An assessment of accounting quality primary centres around the possibility of any understatement or overstatement of the true financial position of the company. The various subcriteria used for this are: the auditor's qualifications (AQL); the method of income recognition (ICR); inventory valuation (IVL); depreciation policies (DPR); and off-balance sheet liabilities (OBSL). The hierarchy for accounting

quality is presented in Figure 6.

For evaluating earnings protection or the company's long term profitability, the subcriteria are in the nature of the following financial ratios: return on capital employed (ROCE); profit margin (PM); earnings on assets/individual business segments (EABS); pre-tax return on average invested capital (PRAIC); operating income as a percentage of turnover (OIT); and coverage ratios (CR). A comparison of these ratios with those of competitor is undertaken and the behaviour of these ratios over time are analyzed. The earnings protection hierarchy is presented in Figure 7.

The assessment of the adequacy of cash flows is with reference to debt servicing needs over the life of the debt instrument being rated. The cash flow analysis may be undertaken by using several subcriteria, such as, ratio of cash flow to fixed charges (CFC); variability of future cash flows (VFC); and ratio of cash flow to short-term & long-term debt (CSLD) etc. The adequacy of cash flow hierarchy is presented in Figure 8.

The evaluation of financial flexibility involves an assessment of the alternative sources of financing available to the company to meet uncertainties. The financial flexibility is reduced if there is excessive dependence on short term debt & interest-sensitive long term loans. The various subcriteria used in the assessment may be: ratios of short-term debt, long-term debt & total debt to capital (DCL); ratio of total liabilities to equity (LE), and the

ability to raise funds from public as well as banks and financial institutions (AFPBF). The financial flexibility criteria is presented in Figure 9.

In the above kind of input matrix, diagonal elements always equal one, and lower triangle elements of the matrix are the reciprocal of upper triangle elements. Thus, pairwise comparison data are collected for only half of the matrix elements, excluding diagonal elements.

It may be noted here that one of the most important advantages of AHP is its built-in systematic checks on consistency in judgements. While comparisons based objective measurements are ordinally (order) and cardinally (magnitude) consistent, the same is not guaranteed when the decision maker uses subjective measurement based on intuition, opinion & the like. In AHP, a consistency ratio (CR) is computed to measure consistency in the decision maker's comparisons of elements. A consistency ratio of zero means that comparisons are perfectly consistent; higher ratios indicate lower consistency. Again the reader may refer to literature (2,3,4) for calculation of CR.

Steps 3 & 4: Estimation of local and global priorities

In step 3, the solution technique of the AHP takes in as input the matrix of pairwise comparisons and produces the relative weights of elements at each level as output. The method most widely used for estimation of the relative

weights is the 'eigenvalue' method though 'geometric mean' is also used for computing weights. However, the entire computational algorithm for estimation is now available in a software product called "Expert Choice" which is widely in use. Step 4 aggregates relative weights of various levels obtained from step 3 to produce a vector of composite weights for the various decision alternatives.

IV AN ILLUSTRATION

Nagarjuna Fertilizers and Chemicals Ltd. (NFCL) was rated BBB+ by CRISIL in June 1992 for their Rs.222.14 Crore Partly Convertible Debenture Issue (Refer CRISIL's RATING SCAN, July 1992). During our joint study, the model AHP developed for this purpose was shown to some merchant bankers and they were asked to rate the major factors and criteria. For simplicity sake the sub criteria (that is, level 4 of Fig.1) were not compared. Finally they were asked "How much would you prefer to give or what is the importance of Rating AAA through Rating D in each of the criteria (Level 3), say IR MP etc., for this company NFCL?. The results of one of their opinions are given in Tables 2, 3 & 4.

The first 2 "choices" BBB and A have got their normalized weightages as 0.2 and 0.15. And CRISIL's rating of BBB+ goes well with this assessment.

V. CONCLUSION

Credit rating is a complex process and involves a wide range of quantitative and qualitative considerations. It requires more than just a comparison of financial ratios to conclude that the CRISIL rating procedure is inconsistent. The present study undertakes no such test of the quality of CRISIL ratings. Rather, it highlights the importance of a systematic consideration of all such factors that form part of the evaluation process in order to guard against inconsistency creeping in. A judgmental model based on Analytic Hierarchy Process is suggested for use by CRISIL. The model is internally consistent and should enable CRISIL to streamline & standardise the overall rating procedure.

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TABLE 1

The fundamental scale

Intensity of importance on an absolute scale	Definition	Explanation
1	Equal importance	Two activities contribute equally to the objective
3	Moderate importance of one over another	Experience and judgement strongly favor one activity over another
5	Essential or strong importance	Experience and judgement strongly favor one activity over another
7	Very strong importance	An activity is strongly favored and its dominance demonstrated in practice
9	Extreme importance	The evidence favoring one activity over another is of the highest possible order of affirmation
2,4,6,8	Intermediate values between the two adjacent judgments	When compromise is needed
Reciprocals	If activity i has one of the above numbers assigned to it when compared with activity j, then j has the reciprocal value when compared with i	

TABLE 2

Sorted Details for Sorted Synthesis of Leaf Nodes
with respect to GOAL (Level 1)

<u>LEVEL 2</u>	<u>LEVEL 3</u>	<u>LEVEL 4</u>	<u>LEVEL 5</u>
BRA	=0.750		
*	IR	=0.341	
*	OE	=0.205	
*	MP	=0.136	
*	ME	=0.068	
FRA	=0.250		
*	EP	=0.100	
*	FF	=0.075	
*	ACF	=0.050	
*	AQ	=0.025	

Overall Inconsistency Index = 0.00

TABLE 3

Sorted Details for Sorted Synthesis of Leaf Nodes
with respect to GOAL (Level 1)

<u>LEVEL 3</u>		<u>LEVEL 4</u>		<u>LEVEL 5</u>	
IR	=0.341			BBB	=0.085
*				AAA	=0.043
*				AA	=0.043
*				A	=0.043
*				BB	=0.043
*				B	=0.043
*				C	=0.043
OE	=0.205			A	=0.051
*				AAA	=0.026
*				AA	=0.026
*				BBB	=0.026
*				BB	=0.026
*				B	=0.026
*				C	=0.026
MP	=0.136			BBB	=0.034
*				AAA	=0.017
*				AA	=0.017
*				A	=0.017
*				BB	=0.017
*				B	=0.017
*				C	=0.017
EP	=0.100			BB	=0.025
*				AAA	=0.013
*				AA	=0.013
*				A	=0.013
*				BBB	=0.013
*				B	=0.013
*				C	=0.013

LEVEL 3LEVEL 4LEVEL 5

FF =0.075

*
*
*
*
*
*
*BBB =0.018
AAA =0.009
AA =0.009
A =0.009
BB =0.009
B =0.009
C =0.009

ME =0.068

*
*
*
*
*
*
*AA =0.017
AAA =0.009
A =0.009
BBB =0.009
BB =0.009
B =0.009
C =0.009

ACF =0.050

*
*
*
*
*
*
*BBB =0.013
AAA =0.007
AA =0.007
A =0.007
BB =0.007
B =0.007
C =0.007

AQ =0.025

*
*
*
*
*
*
*B =0.006
AAA =0.003
AA =0.003
A =0.003
BBB =0.003
BB =0.003
C =0.003

TABLE - 4

Sorted Synthesis of Alternatives with respect to GOAL

OVERALL INCONSISTENCY INDEX = 0.00

BBB	-	0.200
A	-	0.151
BB	-	0.138
AA	-	0.134
B	-	0.128
AAA	-	0.125
C	-	0.125

1.000

(Note - Depending on the case, any one of the factors or alternatives can be omitted from comparison, if its contribution to overall decision making is insignificant. Accordingly, apriori, alternative D (CRISIL - rating symbol) is omitted here)

Level 1
(Goal)

Level 2
(Major Factors)

Level 3
(Criteria)

Level 4
(Sub-criteria)

Level 5
(Alternatives)

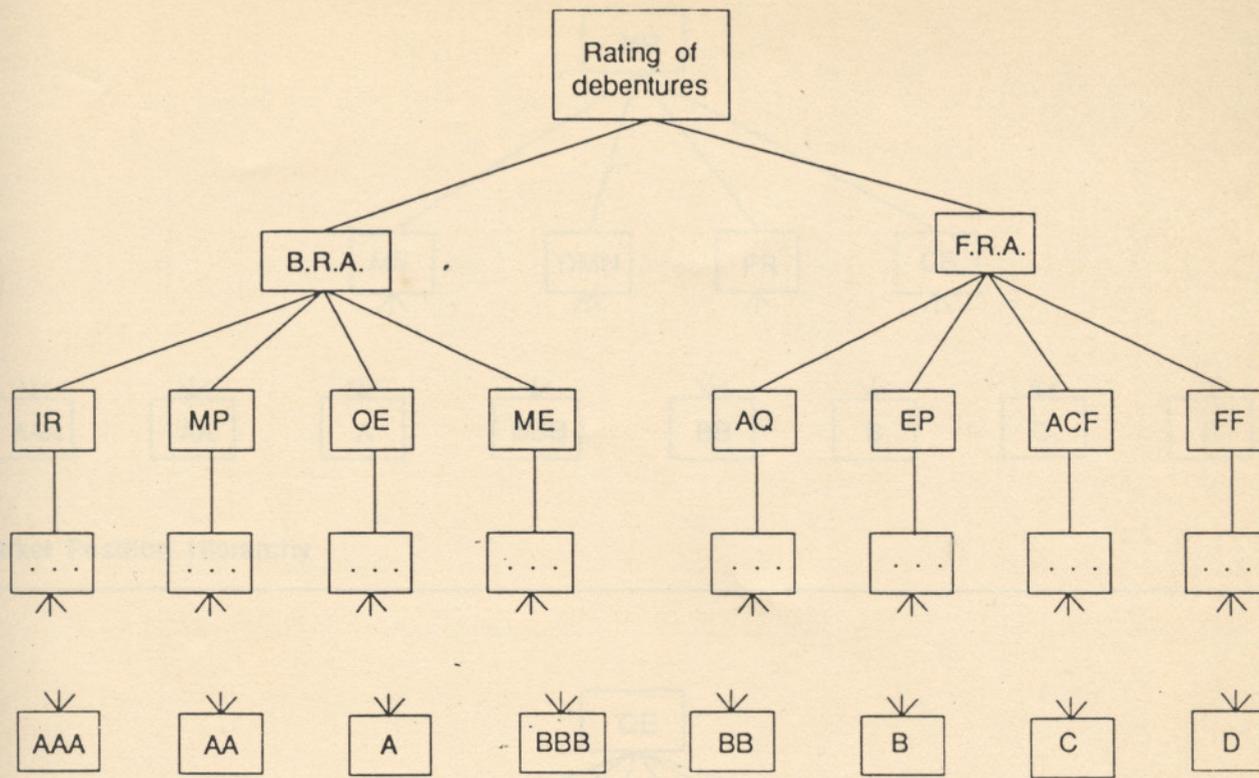


Figure 1 : Debenture Rating Hierarchy

Level 3

Level 4

Level 5

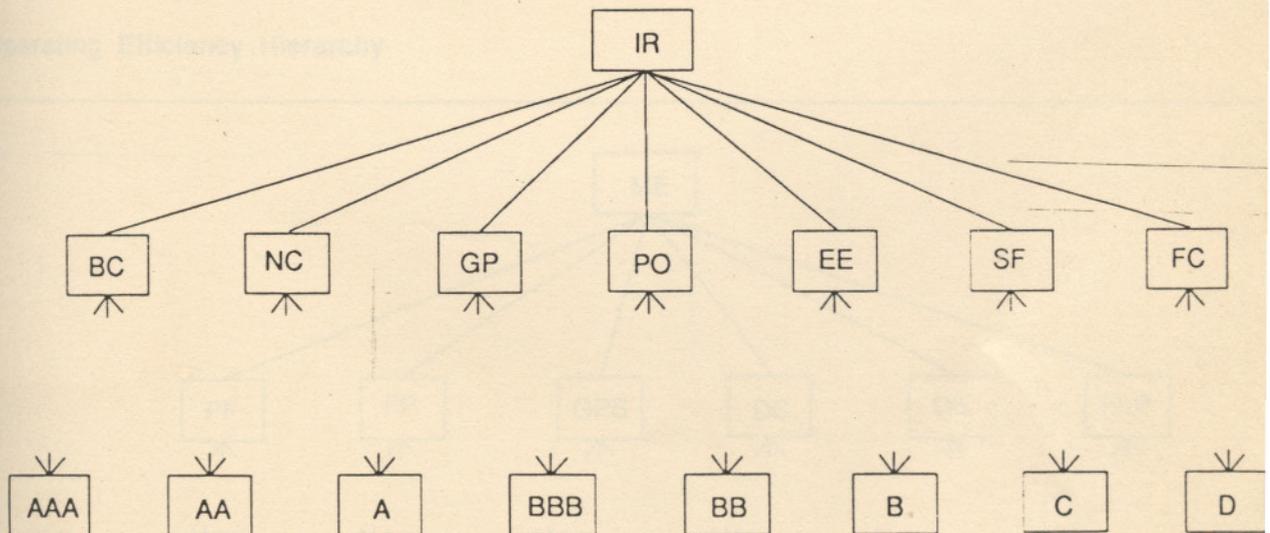


Figure 2 : Industry Risk Hierarchy

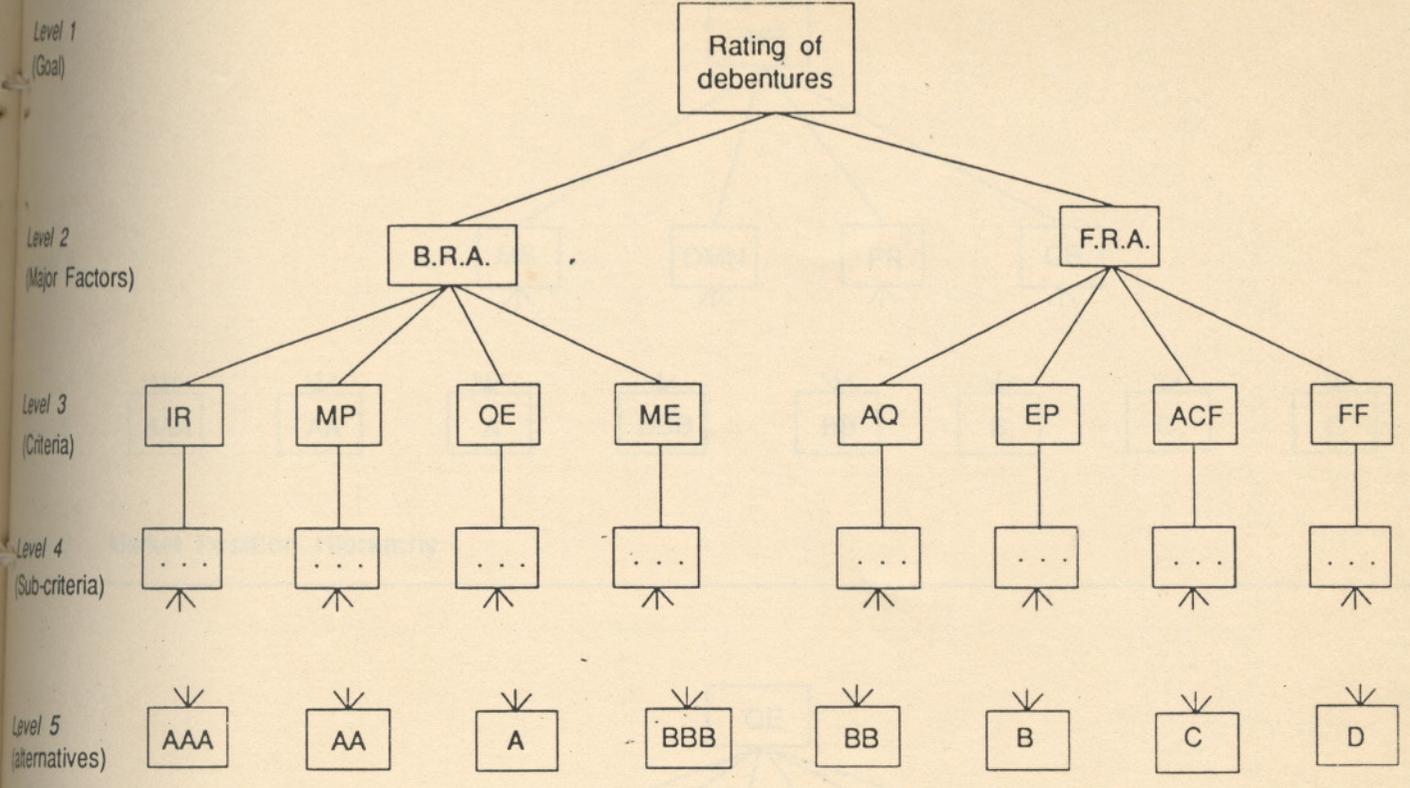


Figure 1 : Debenture Rating Hierarchy

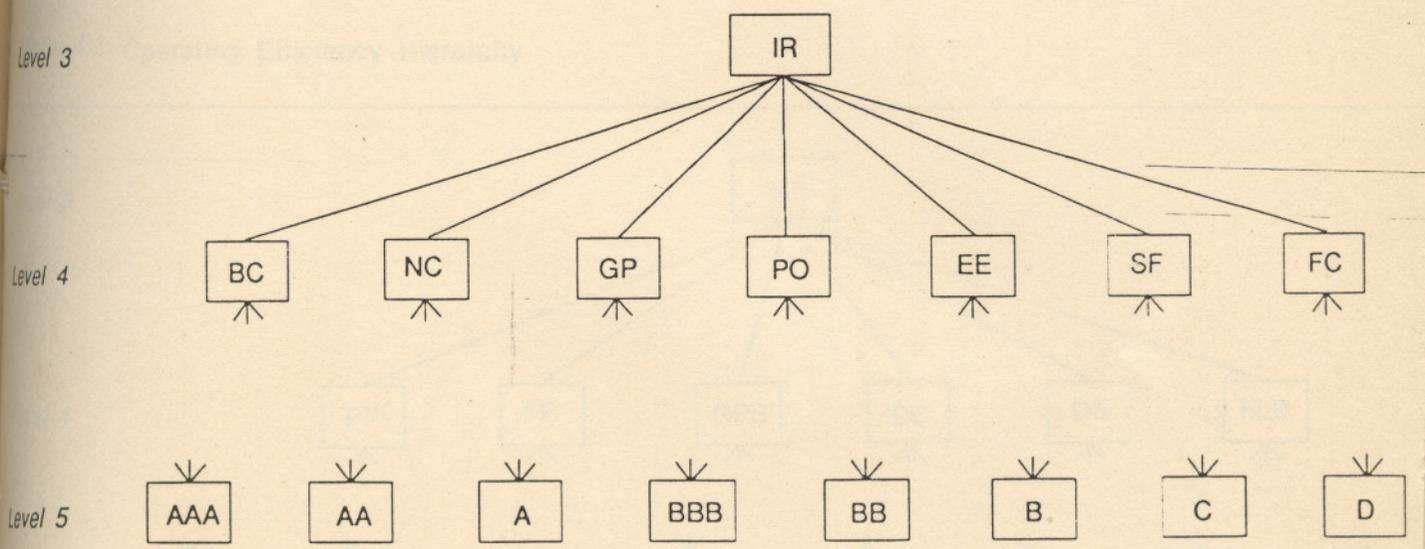
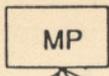
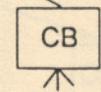
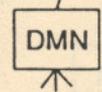


Figure 2 : Industry Risk Hierarchy

Level 3



Level 4



Level 5

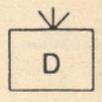
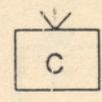
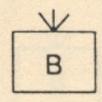
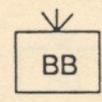
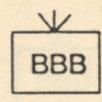
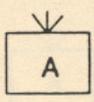
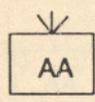
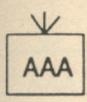
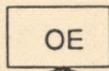
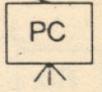
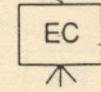
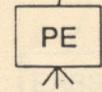


Figure 3 : Market Position Hierarchy

Level 3



Level 4



Level 5

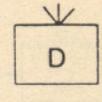
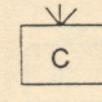
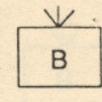
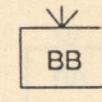
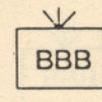
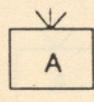
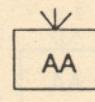
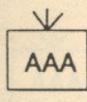
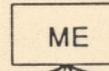
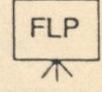
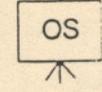
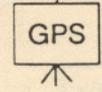
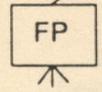


Figure 4 : Operating Efficiency Hierarchy

Level 3



Level 4



Level 5

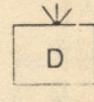
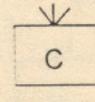
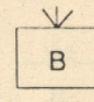
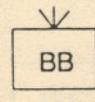
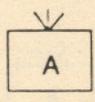
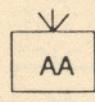
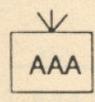


Figure 5 : Management Evaluation Hierarchy

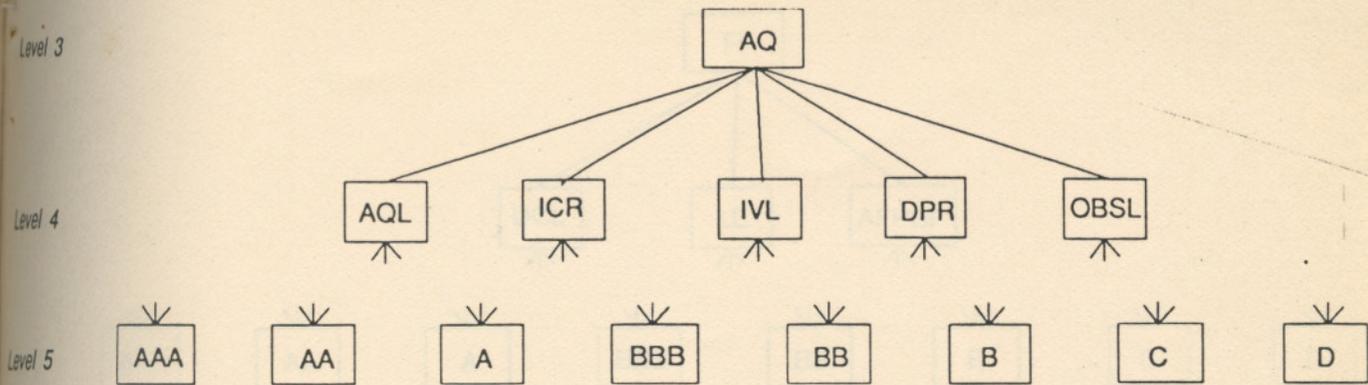


Figure 6 : Accounting Quality Hierarchy

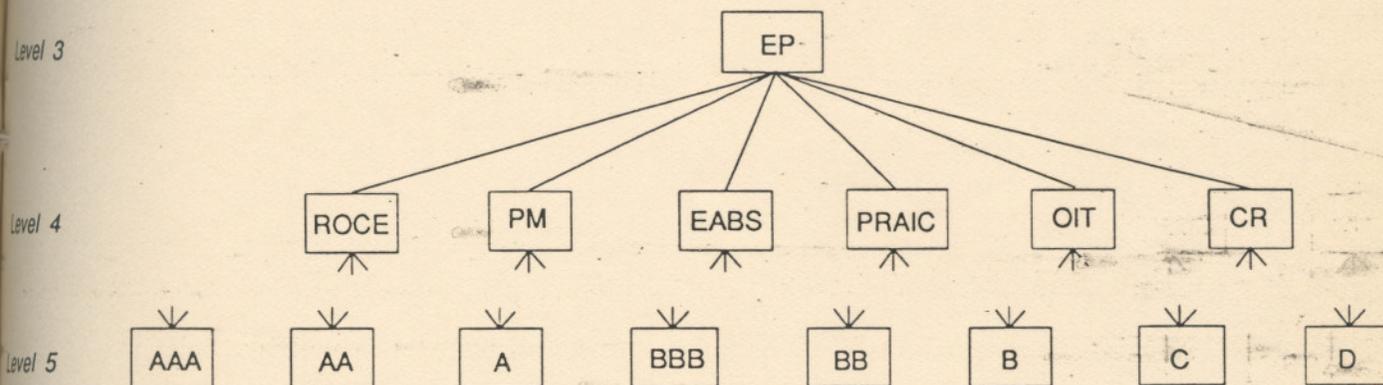


Figure 7 : Earnings Protection Hierarchy

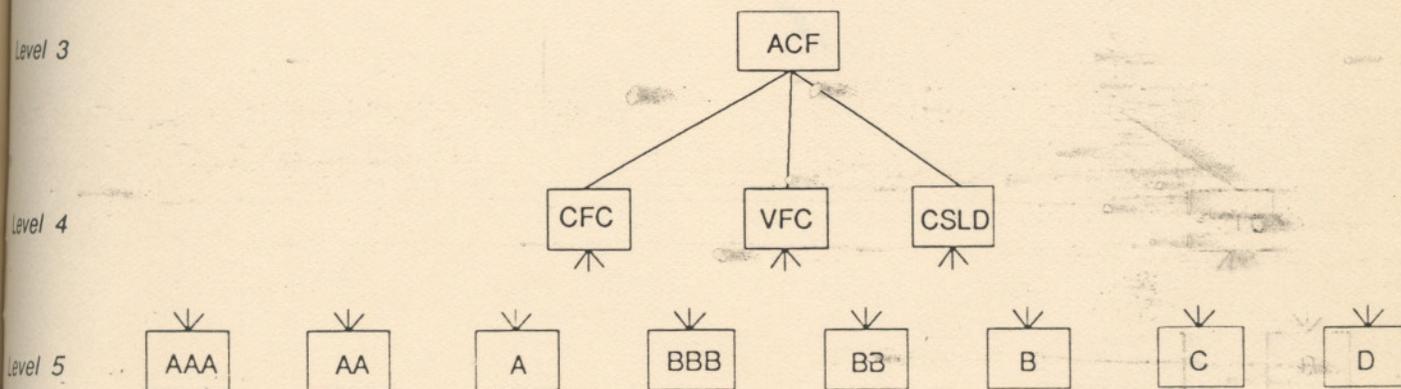


Figure 8 : Adequacy of Cash Flows Hierarchy

Level 3

Level 4

Level 5

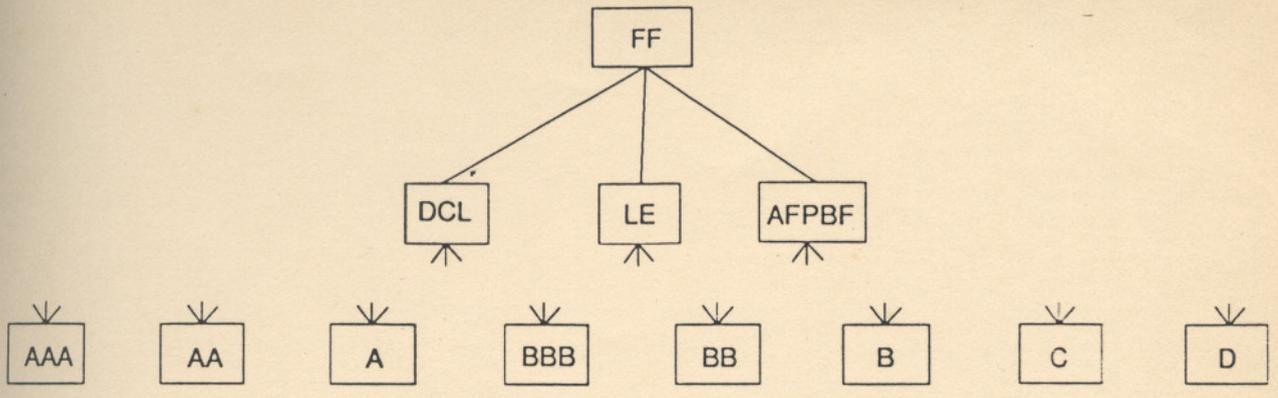


Figure 9 : Financial Flexibility Hierarchy

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