Analysis of Moody's Bottom Rung Firms

Stoyu I. Ivanov*
San Jose State University

Howard Turetsky
San Jose State University

Abstract: Moody's published for the first time on March 10, 2009 a list of Bottom Rung non-financial companies. Considering the high stakes for both Moody's and the potential candidates for inclusion in the list we examine what effects does the inclusion in the Bottom Rung list have on the included company's performance. Surprisingly, none of the original public Bottom Rung firms have been liquidated. We also attempt to identify what criteria exactly is Moody's utilizing to select the companies of the Bottom Rung list. We find that firms included in the Bottom Rung list prior to the inclusion date experience lower cumulative returns compared to a matched sample of control firms. We also find that the Bottom Rung firms do not underperform the control group after the publication of the list.

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JEL Classification: G30, M40

Introduction

The credit rating agencies have had to learn how to please both the investing community and the clients requiring a credit rating at the same time. The investing community requires accurate credit rating, particularly in times when the credit quality of a firm deteriorates. At the same time, there is the agency conflict where the firms-clients of the credit rating firms, "rush" to get the highest possible credit rating.

* Corresponding author.

Recently, the credit rating companies have been blamed for the financial crisis. Most often the credit rating companies are criticized for being too friendly with their clients. They have also been accused of not providing timely signals indicating which companies might be headed for trouble. As Lucchetti and Ng (2007) make it very clear in their Wall Street Journal article: "The credit-rating firms are used to being the whipping boys when things go badly in the markets. They were criticized for being late to alert investors to problems at Enron Corp. and other companies where major accounting misdeeds took place. Yet they also sometimes get chastised when they downgrade a company's credit."

In response to this criticism Moody's published for the first time on March 10, 2009 and made publicly available a list of Bottom Rung non-financial companies. Naturally, companies which pay for a credit rating would not be happy to be put on a list with other companies that might be in trouble. Obviously, companies that are already in trouble would experience even more severe capital markets conditions and increased monitoring after Moody's points a finger at them. Moody's has always been in the forefront of innovation and thus has staked its reputational capital before. As Poon (2003) points out Moody's has been the first of the credit rating agencies to provide unsolicited credit ratings, which led to a lawsuit by the Jefferson County (Colorado) which Moody's subsequently won.

Considering the high stakes for both Moody's and the potential candidates for inclusion in the list we examine what effects does the inclusion in the Bottom Rung list have on the included company's performance. We also attempt to identify what criteria exactly is Moody's utilizing to select the companies of the Bottom Rung list. Most rating companies admit that they assess both business and financial risk with business risk very often based on interviews with managers of the company and industry. This arbitrariness however is not present in the assessment of financial risk which is most often based on financial parameters. Corporate managers can use the findings of this study to identify corporate areas which they need to concentrate on so that their companies do not end up on the Moody's Bottom Rung list. To the best of our knowledge this is the first study to address these issues.

We find that firms included in the Bottom Rung list prior to the inclusion date experience lower cumulative returns compared to a matched sample of control firms. We also find that the Bottom Rung firms do not underperform the control group after the publication of the list. Contrary to what might be expected, none of the original public Bottom Rung firms have been liquidated. The multivariate analysis which we performed suggests that consistently the most important factors signaling that a firm is a potential candidate for inclusion in the Bottom Rung list are the ratios of EBITA and Average Assets, ratio of EBITA and Interest Expense, ratio of Debt and Book Capitalization, and Earnings Before Interest and Tax.

Methodology

We start with all non-regulated firms on COMPUSTAT by excluding firms with SIC codes of 48-49 for regulated utilities and 60-69 for financial services companies. We

examine the cumulative returns one, two, three, six and nine months before and after March 10, 2010 between the Bottom Rung and matching firms. We exclude 7 days before and after March 10, 2010 to allow for assimilation of information. The date March 10, 2010 is selected because the list has been made available to the public by Moody's on this date.

Moody's metrics used in their credit rating analysis is a source of relevant factors for the selection of a firm to be included in the Bottom Rung list. On page 3 of their Bottom Rung list Moody's provides the following description of the methodology used to create the list:

"Building the Bottom Rung Moody's applies strict rating criteria to assemble the Bottom Rung list. Companies included on the list meet one of the following criteria:

1. A Probability of Default (PD) rating of Caa1 or lower.
2. A PD of B3 and a negative outlook.
3. A PD of B3 with rating under review for downgrade."

The exact criteria for including a firm in the list therefore are vague. Thus, in addition to the metrics used in Moody's credit rating analysis we survey the "probability of corporate failure" literature to identify possible factors for Bottom Rung inclusion. The inclusion in the Bottom Rung list is to a certain extent similar to going bankrupt. The common characteristic between a company being included in the Bottom Rung list and going bankrupt is the degree of rarity of both events. Therefore, we utilize some of the "probability of corporate failure" methodology in assessing the probability of a firm ending on Moody's Bottom Rung list.

The decision which financial characteristics are important to the selection of the firm for inclusion on the list is based on analysis relative to a control group of firms. The control group is selected based on a matching exercise. The matching firms are our control sample. Based on the comparative analysis we identify whether the characteristics are unique for the Bottom Rung firms or not. We identify matching firms which have the same two digits SIC code, plus or minus 75% of the Bottom Rung firm's total assets in 2007 and 2008 and the same sign for net income. Based on these criteria the matching firms are as good of candidates for inclusion in the Bottom Rung list but are not added to the list by Moody's.

Logistic regression analysis is employed to identify the factors which might get a company on the list if not properly monitored. The logistic analysis model is as follows:

$$BRF_i = \alpha_i + \beta_{1,i}R1_i + \beta_{2i}R2_i + \beta_{3,i}R3_i + \beta_{4,i}R4_i + \beta_{5,i}R5_i + \beta_{6,i}R6_i + \beta_{7,i}R7_i + \beta_{8,i}R8_i + \beta_{9,i}R9_i + \beta_{10,i}R10_i + \beta_{11,i}NI_i + \beta_{12,i}AT_i + \beta_{13,i}EBIT_i + \varepsilon_i \quad (1)$$

where BRF_i is a dummy variable with one assigned to the Bottom Rung firms and zero to the matching firms. We use ten ratios from Moody's Financial Metrics™ as possible factors. The ratios are R1 – earnings before interest, taxes and amortization to average assets ratio, R2 - earnings before interest, taxes and amortization to interest expense ratio, R3 – earnings before interest, taxes and amortization margin, R4 – funds from operation and interest expense to interest expense ratio, R5 – funds from operation to

debt ratio, R6 – retained cash flow to net debt ratio, R7 – debt to earnings before interest, taxes, depreciation and amortization ratio, R8 – debt to book capitalization ratio, R9 – operating margin ratio and R10 – capital expenditure to depreciation expense ratio. Detailed description of the ratios is provided in the Appendix of the paper. Also, to control for size and profitability, NI_i, AT_i and $EBIT_i$ are employed as control variables in the logistic analysis: NI_i is net income, AT_i is log of total assets, $EBIT_i$ is Earnings Before Interest and Tax.

Logistic regression analysis has been used before in bankruptcy prediction. Ohlson (1980), Gilbert, Menon and Schwartz (1990), Laitinen and Teija Laitinen (2000) and Barniv, Agarwal and Leach (2002) are just a few examples of studies employing this model. The common element among these studies is that they identify possible factors which might be contributing to bankruptcy and use the logistic regression modeling technique to identify the statistically significant factors. The appealing characteristic of the logistic model is that the identification of statistically significant factors can be directly interpreted as affecting the probability of the firm going bankrupt. Thus, the logistic regression coefficients, for the purposes of this study, can also be interpreted as the probability of a firm being included in the Moody's Bottom Rung list (Heij, De Boer, Franses, Kloek and Van Dijk, 2004, p. 443).

Analysis

Moody's selects firms with recent deterioration in credit quality to compile the list. This list is being updated by Moody's every month. The list is available at www.moodys.com/BottomRung. The first Bottom Rung list has been made public on March 10, 2009 and consisted of 283 public and private companies. In this study we examine only the public companies on this list because they have available information in popular databases such as the Center for Research in Security Prices (CRSP) and COMPUSTAT. We identify 109 public companies from this list. Out of these 109 firms 60 are still active (have a CRSP delisting code of 100), 20 merged (have a CRSP delisting code in the 200s), one firm has been involved in an exchange (CRSP delisting code in the 300s) and 28 have been dropped (have CRSP delisting code in the 500s). There are no firms which have been liquidated in this time period (having CRSP delisting code in the 400s).

Only 49 of the 109 public companies have complete data available one, two, three, six and nine months before and after March 10, 2010. Therefore, the control sample of 49 matching firms is identified as follows: the 49 matching firms have the same two digits SIC code, plus or minus 75% of the Bottom Rung firm's total assets in 2007 and 2008 and the same sign for net income. Based on these criteria the matching firms are as good of candidates for inclusion in the Bottom Rung list but are not added to the list by Moody's. We perform matched sample univariate analysis on the 49 Bottom Rung and 49 matching firms' financial metrics.

Table 1: Descriptive Statistics

Variable	N	Mean	Minimum	Maximum	Matched Difference	p-value	
at2008match	49	2033.36	119.53	14469.59			
at2008	49	2291.20	204.96	13882.00	-257.8410	0.1180	
at2007match	49	2402.53	149.13	20767.88			
at2007	49	2283.56	218.46	14666.00	118.9725	0.5306	
nimatch	49	-264.50	-4396.09	120.56			
NI	49	-388.28	-5313.29	82.88	123.7859	0.2860	
ebitmatch	49	36.97	-974.09	1155.48			
EBIT	49	-14.31	-968.00	976.00	51.2877	0.2426	
revtMatch	49	1854.00	53.04	14495.54			
REVT	49	2407.43	127.79	24326.85	-553.4230	0.0353	**
r1match	49	0.0507	-0.3424	0.2607			
r1	49	0.0550	-0.2966	0.4019	-0.0043	0.6961	
r2match	49	3.5011	-13.4999	41.8878			
r2	49	1.2303	-7.0980	13.4562	2.8641	0.0213	**
r3match	49	0.0497	-1.2502	0.3432			
r3	49	0.0347	-1.0696	0.3528	0.0150	0.3770	
r4match	49	4.9600	-0.7603	27.9529			
r4	49	1.7807	-5.7878	16.1959	3.8644	0.0008	***
r5match	49	0.1679	-0.3020	1.1635			
r5	49	0.0375	-0.4756	0.4294	0.1304	0.0004	***
r6match	49	0.1529	-0.5815	1.0903			
r6	49	0.0102	-1.2079	0.4294	0.1427	0.0048	***
r7match	49	6.0822	-50.7558	39.8504			
r7	49	4.9373	-93.2907	48.9511	1.1449	0.7485	
r8match	49	0.6236	0.1151	2.1269			
r8	49	0.8486	0.3768	1.8082	-0.2250	0.0006	***
r9match	49	-0.2206	-2.1001	0.1118			
r9	49	-0.3012	-3.1931	0.0417	0.0806	0.3288	
r10match	49	1.5089	0.0000	8.7503			
r10	49	1.5161	0.1416	18.3086	-0.0073	0.9871	

Table 1 provides descriptive statistics of financial characteristics of Bottom Rung and matched sample of control firms. The table also provides univariate tests on the different variables used in the analysis. The table indicates that the matching exercise was successful in that total assets in 2007 and 2008 and net income are not statistically different between the sample of Bottom Rung Firms and matching sample of firms. Revenues and some of the ratio metrics of Bottom Rung and match firms however are statistically different. Average revenues of the Bottom Rung firms are 2,407.43 million,

whereas average revenues of matching firms are less 1,854 million. Matching firms have statistically significant and higher R2 - earnings before interest, taxes and amortization to interest expense ratio, R4 – funds from operation and interest expense to interest expense ratio, R5 – funds from operation to debt ratio, R6 – retained cash flow to net debt ratios, but statistically significant and lower R8 – debt to book capitalization ratio.

Table 2: Univariate Analysis on Cumulative Returns of Bottom Rung and Control Group Firms

Variable	N	Mean	Minimum	Maximum	Matched Difference	p-value	
1m_beforeMatch	49	-0.2860	-0.7403	0.0494			
1m_before	49	-0.3203	-0.8519	0.2683	0.0344	0.4468	
2m_beforeMatch	49	-0.3291	-0.9136	0.6634			
2m_before	49	-0.3157	-0.9324	1.4039	-0.0134	0.8338	
3m_beforeMatch	49	-0.6920	-0.9878	0.7063			
3m_before	49	-0.2055	-0.8944	2.6535	-0.4865	<.0001	***
6m_beforeMatch	49	-0.6789	-0.9851	-0.0921			
6m_before	49	-0.7578	-0.9850	-0.0277	0.0789	0.0594	*
9m_beforeMatch	49	-0.7200	-0.9897	-0.1221			
9m_before	49	-0.7877	-0.9893	0.0165	0.0677	0.0794	*
1m_afterMatch	49	0.5530	-0.0117	2.2121			
1m_after	49	0.5579	-0.6786	2.5882	-0.0049	0.9673	
2m_afterMatch	49	0.7351	-0.0714	2.7727			
2m_after	49	0.9140	-0.6786	5.3933	-0.1790	0.3370	
3m_afterMatch	49	2.5253	-0.4852	19.0000			
3m_after	49	1.1150	-0.6786	5.2400	1.4103	0.0077	***
6m_afterMatch	49	1.9711	-0.4436	8.9412			
6m_after	49	2.4542	-0.8026	12.6829	-0.4831	0.3234	
9m_afterMatch	49	2.2864	-0.5521	16.4118			
9m_after	49	2.8312	-0.8026	21.1219	-0.5448	0.4351	

Next, we analyze the market performance of the Bottom Rung firms prior and after inclusion to the list relative to the control group of firms. We compute the difference in cumulative returns based on matched sample methodology. We define the difference in returns as follows:

Difference in Returns = Return (Matching Firm) - Return (Bottom Rung Firm) (2)

The univariate test results on the difference in returns, presented in Table 2, indicate that one and two months before and after the inclusion in the Bottom Rung list the firms experience similar to the matching firms' returns. However, when the longer periods are examined some patterns emerge. When we look at six and nine months

before the inclusion on the list the Bottom Rung firms underperform relative to the match firms but improve their performance three months before the inclusion date. The six month underperformance is 0.0789% and the nine month underperformance is 0.0677%. The three month extra performance by Bottom Rung firms is 0.4865%. Even though both types of firms have negative returns the Bottom Rung firms have even lower negative returns six and nine months before the inclusion event. When we examine the periods after, the six and nine months after the inclusion event the Bottom Rung firms perform in statistically similar fashion to the firms which are good candidates for the list but are not included in the list. However, the economic performance of the Bottom Rung firms is superior to the match firms' economic performance. The Bottom Rung firms' cumulative return is higher by 0.4831% after six months and by 0.5448% nine months after the event relative to the match firms' cumulative returns. However, the Bottom Rung firms underperform three moths after the inclusion event relative to the match firms. The three months returns of the Bottom Rung firms are lower by 1.4103% relative to the match firms' returns. Both types of firms have positive cumulative returns after the inclusion in the Bottom Rung list event.

The fact that the firms are included in the list however does not seem to have an effect on their returns after the inclusion date. We find that the cumulative returns of the Bottom Rung firms and matching firms are not statistically different. The table also suggests that prior to the inclusion date there are meaningful signals suggesting that the Bottom Rung firms are anticipated by the market to underperform indicated by the lower cumulative returns. We next examine the question what other factors besides the lower returns might be used by Moody's to choose these firms and not the matching firms by using a multivariate analysis. Before we conduct the multivariate analysis we examine the correlation among the variables.

Table 3 provides correlation coefficients among the different variables used in the logistic regression analysis. The table suggests that caution needs to be exercised when variables R1 , R2, R3, and R4, R5, R6 and NI, AT are combined in the multivariate analysis because of the high correlation coefficients among these sets of variables.

Table 4 shows the logistic regression results. The dependent variable is defined as having values of one and zero with one assigned to the Bottom Rung firms and zero to the matching firms. The independent variables in the analysis are the ratios used most often by Moody's in their analysis and control variables used in the bankruptcy literature.

The multivariate analysis suggests that consistently the most important factors for the identification of potential firms to be included in the Bottom Rung list are variables R1, R2, R8 and earnings before interest and tax. Where R1 is defined as earnings before interest tax and amortization divided by average assets, R2 is defined as earnings before interest tax and amortization divided by interest expense, R8 is defined as debt divided by book capitalization. These variables are consistently statistically significant in three model specifications designed to exclude variables which might be highly correlated among each other.

Table 3: Correlation Table

	r2	r3	r4	r5	r6	r7	r8	r9	r10	at	ni	ebit
r1	**0.60**	**0.85**	-0.01	0.04	0.08	0.16	0.14	0.36	-0.11	0.12	0.10	**0.59**
r2	1	0.45	0.50	0.14	0.17	0.08	-0.16	0.25	0.06	-0.01	0.04	0.26
r3		1	-0.08	-0.08	-0.05	0.16	0.12	0.30	-0.12	0.18	0.01	0.50
r4			1	**0.59**	**0.52**	0.08	-0.32	0.10	0.07	-0.17	0.15	-0.02
r5				1	**0.86**	0.04	-0.31	0.06	0.02	-0.18	0.16	-0.01
r6					1	0.09	-0.21	0.02	0.04	-0.12	0.10	0.00
r7						1	0.05	0.38	-0.16	-0.02	0.31	0.10
r8							1	-0.13	-0.14	0.27	-0.20	0.19
r9								1	0.07	-0.08	**0.55**	0.27
r10									1	-0.07	0.13	0.02
at										1	**-0.60**	0.31
ni											1	0.14

Table 4: Logistic Regression Results

	Panel A			Panel B			Panel C		
	Estimate	p-value		Estimate	p-value		Estimate	p-value	
Const	1.7948	0.0487	**	1.5979	0.0742	*	1.4157	0.0905	*
r1	-25.0501	0.0088	***	-11.2612	0.0468	**	-9.6911	0.0552	*
r2	0.2994	0.037	**	0.2333	0.0864	*	0.1930	0.1148	
r3	4.9277	0.0411	**						
r4	-0.1156	0.4641		-0.1031	0.4658				
r5	6.7927	0.1381		6.0131	0.1616		4.0990	0.2068	
r6	1.1677	0.6008		0.6857	0.7470		0.7635	0.7263	
r7	-0.0058	0.7265		-0.0020	0.9002		-0.0027	0.8694	
r8	-1.8447	0.0616	*	-2.0928	0.0394	**	-2.0466	0.0386	**
r9	0.1163	0.8635		0.1481	0.8118		0.1450	0.8148	
r10	-0.1387	0.226		-0.1216	0.3180		-0.1163	0.3342	
ni	0.0002	0.7302		0.0000	0.9632		0.0000	0.9905	
at	0.0001	0.8573							
ebit	0.0043	0.0134	**	0.00331	0.0193	**	0.0031	0.0224	**
n	98			98			98		
Test	Chi-Sq	p-value		Chi-Sq	p-value		Chi-Sq	p-value	
LR	36.6038	0.0005	***	31.4171	0.0009	***	30.9100	0.0006	***
Score	26.7918	0.0133	**	24.0463	0.0125	**	23.9023	0.0079	***
Wald	18.0584	0.1553		17.2757	0.1000	*	17.0607	0.0730	*

The factor loadings can directly be interpreted as contributing to the probability of the firm being included in the Bottom Rung list which is one of the appealing characteristics of logistic regression analysis. Thus, the negative coefficients of R1 and R8 ratios can be interpreted as follows: the higher the R1 and R8 ratios, the lower the probability of the firm being included in the list. The influence of R2 and EBIT can be interpreted as follows: the higher R2 and EBIT the higher the probability of the firm to be in the list, because these factors have positive coefficients. The influence of R1, R2 and R8 on the probability of inclusion in the list makes economic sense: the profitable and less indebted firms relative to the size of the firm should be less likely to be included in the list.

Conclusion

Moody's selects firms with recent deterioration in credit quality to compile a list and updates the list every month. The first Bottom Rung list was issued on March 10, 2009 and consisted of 283 public and private companies. Naturally, in this study we examine only the public companies on this list because they have available information in popular databases such as CRSP and COMPUSTAT. Surprisingly, none of the original public Bottom Rung firms have been liquidated. We find that firms included in the Bottom Rung list prior to the inclusion date experience lower cumulative returns compared to a matched sample of control firms. We also find that the Bottom Rung firms do not underperform the control group after the publication of the list. The multivariate analysis suggests that consistently the most important factors for the identification of potential firms to be included in the Bottom Rung list are the ratios of earnings before interest tax and amortization and average assets, ratio of earnings before interest tax and amortization and interest expense, ratio of debt and book capitalization, and earnings before interest and tax as a separate variable.

In future research it would be interesting to examine the performance of the firms in the recent Bottom Rung lists. In this study we are limited to examining only the public firms and their performance. It might be interesting to study the performance of the private firms on the list to complete the assessment of Moody's methodology to create the Bottom Rung list.

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Appendix

We use the following ratios from Moody's Financial Metrics™ as possible factors:
$R1_i$=EBITA$_i$ / Average Assets$_i$,
$R2_i$=EBITA$_i$ / Interest Expense$_i$,
$R3_i$=EBITA Margin$_i$= EBITA $_i$ / Net Sales $_i$,
$R4_i$=(FFO$_i$ + Interest Expense$_i$) / Interest Expense$_i$,
$R5_i$=FFO$_i$ / Debt$_i$,
$R6_i$=RCF$_i$ / Net Debt$_i$,
$R7_i$=Debt$_i$ / EBITDA$_i$,
$R8_i$=Debt$_i$ / Book Capitalization$_i$,
$R9_i$=Operating Margin$_i$ = Net Income $_i$ / Net Sales $_i$,
$R10_i$=Capital Expenditure$_i$ / Depreciation Expense$_i$,
where EBIT is Earnings Before Interest and Tax, EBITDA is Earnings Before Interest, Tax, Depreciation and Amortization, RCF is retained cash flow, and FFO is funds from operation.