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Bond Rating Agencies and Stock Analysts: Who Knows What When?

Louis H. Ederington and Jeremy C. Goh*

Abstract

Both bond rating agencies and stock analysts evaluate publicly traded companies and communicate their opinions to investors. Comparing the timeliness of each, we find that Granger causality flows both ways. While most bond downgrades are preceded by declines in actual and forecast earnings, both actual earnings and forecasts of future earnings tend to fall following downgrades. Although part of this post-downgrade forecast revision can be attributed to negative news regarding actual earnings, most appears to be reaction to the downgrade itself. We find little change in actual earnings following upgrades. Analysts, however, tend to increase their forecasts of future earnings.

I. Introduction

While they service somewhat different investor groups, both bond rating agencies and stock analysts evaluate publicly traded companies and communicate their findings and opinions to investors. Evidence indicates that both provide new information to the market since stock prices react to both bond rating changes (at least downgrades) and changes in analysts' earnings forecasts. This paper explores what information each provides and when by examining changes in both actual earnings and analysts' forecasts of future earnings around bond rating changes by Moody's over the period 1984–1990.

While rating changes and revisions in analysts' earnings forecasts apparently bring some new information to the market, there is also evidence that both react to public information that the market already has. For instance, although studies of bond ratings have established that the stock market reacts negatively to bond downgrade announcements (Holthausen and Leftwich (1986), Hand, Holthausen, and Leftwich (1992), Wansley and Clauretie (1985), Cornell, Landsman, and Shapiro (1989), and Matolcsy and Lianto (1995)), it has also been observed that

*Finance Division, Michael F. Price College of Business, University of Oklahoma, Norman, OK 73019, and Finance Department, College of Business, Drexel University, Philadelphia, PA 19104, respectively. The authors appreciate the comments of Uday Chandra, Nandu Nayar, Karyn Williams, Josef Lakonishok (associate editor and referee), and finance workshop participants at the University of Oklahoma. An earlier version of this paper received the Fixed Income Analysts award at the 1997 FMA meetings.

downgrades (upgrades) tend to occur following periods of negative (positive) abnormal returns (Holthausen and Leftwich (1986), Wansley and Clauretie (1985), Matolcsy and Lianto (1995)). Likewise, while studies of analysts' earnings forecasts have found that the market reacts to both upward and downward revisions in analysts' earnings forecasts (Givoly and Lakonishok (1984), Lys and Sohn (1990), and Stickel (1991)), it has also been observed that upward (downward) revisions in these forecasts tend to occur after firms have experienced positive (negative) abnormal returns (e.g., Lys and Sohn (1990), Abarbanell (1991), and Chan, Jegadeesh, and Lakonishok (1996)).[1]

Consequently, it is an open question whether ratings or earnings forecasts bring more information to the market and which is more timely. While there are more stock analysts than rating agencies and analysts focus specifically on the outlook for the firm's equity, the rating agencies claim to receive inside information unavailable to stock analysts such as minutes of board meetings, profit breakdowns by product, and new product plans (Ederington and Yawitz (1987)). They claim that a "Chinese wall" prevents even their own stock analysts from having access to this information. If stock analysts feel that the rating change likely reflects inside information unavailable to them, bond rating changes could lead financial analysts to change their earnings forecasts. Earnings forecasts might also be altered if a surprise rating change is expected to affect the firm's future interest costs.

Our primary concern in this paper is with Granger causality, that is whether rating changes help predict earnings forecasts and vice-versa. If rating changes Granger cause earnings forecast revisions, then we should observe negative (positive) earnings forecast revisions following downgrades (upgrades). If analysts' forecasts Granger cause rating changes, then negative (positive) revisions in earnings forecasts should be observed prior to downgrades (upgrades). Of course, Granger causality can flow both ways and a finding that one "Granger causes" the other does not preclude that both ratings and analysts' earnings forecasts are responding at different speeds to other public information, such as recent earnings surprises, so we also explore this issue.

Our analysis of forecast revisions around rating changes may help explain why the market reacts to downgrades but not upgrades. The hypotheses that i) the differential response to downgrades and upgrades arises because companies voluntarily release favorable information but are reluctant to release unfavorable information, or that ii) the rating agencies expend more resources in detecting deteriorations in credit quality than improvements, imply that stock analysts' forecasts should adjust more fully prior to upgrades than prior to downgrades.

[1]The purpose of bond ratings is to communicate information to bondholders and bad (good) news to bondholders need not be bad (good) news to stockholders. However, Goh and Ederington (1993) find that most downgrades reflect a downward revision in the firm's prospective cash flows, which is bad news for both. Downgrades (upgrades) could occur, not because the rating agencies revise downward (upward) their expectations of future cash flows, but because they revise upward (downward) their evaluations of the riskiness of that cash flow stream. In a test of this, Chandra and Nayar (1998) use analyst earnings forecasts to determine whether commercial paper rating downgrades are due to changes in expected cash flows or changes in perceived riskiness. They conclude that both mild and severe commercial paper downgrades are associated with a downward revision in earnings expectations while severe downgrades also appear to be associated with an increase in perceived riskiness.

In the following section, we explain our data and conduct an event study of the market reaction to rating changes. In Section III, we test for Granger causality between rating changes and analysts' earnings forecasts. In Section IV, we document actual earnings patterns and test whether the sharp change in earnings forecasts observed following downgrades could represent a lagged response to negative news regarding actual earnings rather than the downgrade per se. Conclusions are summarized in Section IV.

II. Rating Changes and the Market Reaction

A. Data

For this analysis, we collected data on all corporate bond rating changes by Moody's between January 1, 1984, and December 31, 1990—a total of 1554. Of these, the I/B/E/S tapes contain earnings forecasts surrounding 1260. Like Brous (1992), Lys and Sohn (1990), and others, we measure the revision during month t of forecasts of firm i's earnings, $FR_{i,t}$, as the change in the consensus forecast of earnings per share deflated by the stock price. Specifically,

$$(1) \qquad FR_{i,t} = \frac{(F_{i,t} - F_{i,t-1})}{P_i^*} * 100,$$

where $F_{i,t}$ is the median analyst earnings forecast (from I/B/E/S) as of month t of firm i's annual earnings per share for the current fiscal year, and P_i^* is the price per share six months prior to the rating revision.[2] For inclusion in our sample, we require that the I/B/E/S tape contain earnings forecasts for the firm from 12 months prior to the rating change through 12 months after. Since previous studies have shown that the I/B/E/S tapes contain data errors, we eliminate a firm/rating change from our sample if $FR_{i,t}$ is more than five standard deviations (defined over all firms) from the overall mean in any month. After the initial round of data eliminations, the standard deviation is recalculated and, again, firms with observations outside five standard deviations are eliminated. The resulting data set consists of 629 downgrades and 389 upgrades.

B. The Market Reaction to Rating Changes

In order to compare analyst reactions to rating changes with the reaction of investors, we first conduct a standard event study of the market reaction to an announcement of a rating change.[3] Our announcement dates (day 0) are those listed by Moody's in Moody's Bond Survey (MBS). Some, but not all, of these

[2]We normalize the earnings forecasts using the price six months prior to the forecast revision to avoid picking up price changes caused by the earnings forecast revisions during our observation period. $F_{i,t}$ and $F_{i,t-1}$ are always for the same fiscal year. For instance, suppose that the nearby forecasts in January and February are for the 1989 fiscal year while March's is for the 1990 fiscal year. In that case, $FR_{i,t}$ is calculated for February using the January and February forecasts for 1989 earnings while March's is calculated using the February and March forecasts of 1990 earnings.

[3]It is not possible to conduct a similar event study of the reaction to earnings forecast revisions since i) numerous analysts forecast each firm's earnings and ii) and our data do not identify revision dates.

are reported in the Wall Street Journal; if they are, it is almost always the day following that listed in MBS, so our announcement window consists of days 0 and +1. We eliminate a rating change from our sample if the Wall Street Journal Index recorded another announcement by the firm during the three-day window −1 to +1. Because there are no observations for a firm on CRSP's NYSE, ASE, and NASDAQ databases or because Moody's announcement does not occur on a market day, we lose a few more observations. The resulting subsample consists of 494 downgrades and 310 upgrades.

Since both our data and previous studies have shown that downgrades tend to occur after other bad news and when the firm's stock has been doing poorly, we use a post rating change period (day +60 through +315) to estimate a market model for each firm. These market models are estimated using an equally weighted market index and abnormal returns are defined in the usual manner by subtracting the expected return implied by the estimated market model from the daily return for firm i.

Results are reported in Table 1. Consistent with virtually all earlier studies, such as Holthausen and Leftwich (1986) and Hand et al. (1992), we observe a significant negative stock market reaction to downgrades but no reaction to upgrades. For downgrades, the two-day CAR is −1.29% with $z = -5.94$. Also, 60.3% of the abnormal returns over this two-day period are negative, which is significantly different from 50% at the 0.01 level. Clearly, the market views most downgrades as informational events. Like these earlier studies, we also observe significant negative abnormal returns prior to downgrades. The $(-45, -1)$ CAR is −5.17% with $z = -4.82$, indicating that the market has been receiving other negative news about the firm prior to most downgrades. These event study findings indicate that downgrades not only are partially a response to information that both earnings analysts and the market already have, but also that downgrades bring some new information to the market.

In the case of upgrades, we observe significant positive CARs prior to upgrades but no reaction to the upgrade announcement itself. The $(-45, -1)$ CAR is 3.85% with $z = 5.54$, while the (0,1) CAR is only 0.05% with $z = 0.21$. The insignificant (0,1) CAR is consistent with previous event studies. Apparently, in the case of upgrades, the bond rating agencies are reacting to information that the market already has and has impounded in prices.[4]

III. Granger Causality between Rating Changes and Earnings Forecast Revisions

We now turn attention to testing Granger causality between rating changes and analysts' earnings forecasts. Mean values of FR, our measure of the revision in analysts' consensus earnings forecast for the current fiscal year as defined

[4]Somewhat surprisingly, there is weak evidence of small, but significant, positive abnormal returns well after the upgrade. Although the ARs on the days immediately following the upgrade are small, insignificant, and of mixed sign, the $(+2, +45)$ CAR is 1.32% with $t = 1.76$ and $z = 2.70$. This could mean that the market fails to fully impound all the information in the upgrades when they occur. However, since the $(+2, +45)$ CAR is small and just barely significant, and since the individual ARs from +2 through +10 are of mixed sign, we are reluctant to conclude much from these results.

TABLE 1

The Market Response to Rating Changes

Day or Window	Downgrades			Upgrades		
	AR-CAR	*z*-Statistic	% Positive	AR-CAR	*z*-Statistic	% Positive
−10	−0.23%	−2.6**	45.3%*	0.02%	0.7	47.1%
−9	−0.11%	−0.5	42.3%*	0.07%	0.6	51.6%
−8	−0.27%	−0.9	48.4%	−0.09%	−0.7	49.4%
−7	−0.22%	−0.1	50.0%	0.33%	2.9**	53.8%
−6	−0.14%	−1.1	44.5%*	0.09%	0.7	49.0%
−5	−0.07%	−0.5	46.0%	−0.03%	−0.4	47.4%
−4	−0.09%	0.2	46.4%	−0.01%	0.4	47.7%
−3	−0.17%	−0.5	42.3%*	0.19%	1.5	51.0%
−2	−0.31%	−2.1*	43.1%*	−0.01%	0.7	50.3%
−1	−0.20%	−1.2	45.8%	0.23%	2.6**	52.9%
0	−0.85%	−4.5**	40.3%*	0.10%	0.8	50.3%
+1	−0.44%	−3.9**	43.7%*	−0.05%	−0.5	50.3%
+2	−0.08%	−0.8	46.2%	0.09%	0.3	50.3%
+3	0.05%	0.9	48.8%	0.10%	1.1	50.3%
+4	0.06%	1.0	46.6%	−0.00%	−0.7	48.1%
+5	−0.00%	1.2	49.0%	−0.07%	0.1	46.8%
+6	−0.10%	0.6	48.6%	−0.07%	−0.5	45.5%
+7	−0.37%	−2.0*	44.9%*	0.06%	1.0	49.0%
+8	0.03%	−0.5	48.4%	0.11%	0.9	49.0%
+9	−0.12%	0.6	43.3%*	−0.10%	−1.4	45.8%
+10	−0.11%	−0.8	48.0%	0.14%	1.2	50.0%
(0, +1)	−1.29%	−5.94**	39.7%*	0.05%	0.21	50.3%
(−45, −1)	−5.17%	−4.82**	40.9%*	3.85%	5.54**	61.6%*
(+2, +45)	−0.83%	0.34	48.6%	1.32%	2.70**	56.8%*

Mean abnormal returns and cumulative abnormal returns around announcements of bond rating changes by Moody's over the period 1/1/84–12/31/90 are reported. Abnormal returns are calculated using a market model estimated over the period (+60, +315) where 0 is the day Moody's announces the rating change. * and ** denote *z*-statistics, which are significantly different from zero at the 0.05 or 0.01 levels or ratios of positive abnormal returns, which are significantly different from 0.5 in two-tailed tests.

in equation (1), are reported in Table 2 from 12 months before a rating change through 12 months after. Table 2 shows large and significant negative revisions in analysts' earnings forecasts both prior to and after downgrades (Panel A), while there is no significant pattern either before or after upgrades (Panel B).

A. Abnormal Earnings Forecast Revisions

It is dangerous, however, to draw conclusions about Granger causality from the raw figures in Table 2 because these forecast revisions are not necessarily surprises. Previous studies of earnings forecast revisions, such as O'Brien (1988), Brous (1992), Lys and Sohn (1990), Kang, O'Brien, and Sivaramakrishnan (1994), and Chan, Jegadeesh, and Lakonishok (1996), have documented the following: i) earnings analysts tend to be overly optimistic initially and lower their forecasts as the earnings release date approaches, meaning that negative forecast revisions are the norm; and ii) since not all analysts update their forecasts each month, revisions in the median earnings forecast tend to be serially correlated, that is, if the

TABLE 2

Earnings Forecast Revisions Before and After Bond Rating Changes

Month Relative to Rating Change	*Panel A. Downgrades*		*Panel B. Upgrades*	
	Mean Revision in Median Analyst Forecast, $FR_{i,t}$	*t*-Value	Mean Revision in Median Analyst Forecast, $FR_{i,t}$	*t*-Value
−12	−0.318	−7.12**	−0.056	−0.83
−11	−0.277	−5.14**	−0.071	−1.55
−10	−0.397	−7.33**	−0.094	−2.17*
−9	−0.470	−7.46**	−0.042	−1.07
−8	−0.395	−8.61**	−0.060	−1.25
−7	−0.429	−8.30**	−0.012	−0.31
−6	−0.474	−8.83**	−0.110	−1.54
−5	−0.474	−8.66**	−0.032	−0.62
−4	−0.421	−8.44**	−0.023	−0.64
−3	−0.598	−9.33**	0.055	1.80
−2	−0.596	−8.94**	−0.044	−0.92
−1	−0.636	−10.35**	−0.029	−0.51
Rating Change	−0.700	−9.24**	0.079	1.56
1	−0.835	−10.10**	0.013	0.27
2	−0.533	−7.36**	0.080	1.65
3	−0.556	−7.42**	−0.116	−2.48*
4	−0.736	−7.74**	0.012	0.21
5	−0.570	−7.66**	0.018	0.53
6	−0.512	−7.29**	−0.093	−3.07**
7	−0.395	−5.49**	−0.048	−1.26
8	−0.405	−6.09**	−0.068	−1.65
9	−0.426	−6.06**	−0.095	−2.55
10	−0.510	−6.08**	−0.071	−2.19
11	−0.287	−4.12**	−0.082	−1.46
12	−0.421	−5.85**	−0.173	−3.12
Observations	629		389	

The mean forecast revision, $FR_{i,t} = [(F_{i,t} - F_{i,t-1})/P_i^*] * 100$, is reported where $F_{i,t}$ is the median analyst forecast in month t of earnings per share for the current fiscal year, and P_i^* is the price per share six months prior to the rating revision. * and ** on the *t*-values denote means that are significantly different from zero at the 0.05 and 0.01 levels, respectively, in two-tailed tests.

median forecast falls one month due to new information, it will tend to continue to fall in future months as other analysts update. To test for Granger causality, we need measures of the *surprise* forecast revisions after correcting for these two effects.

We employ two procedures or models to isolate surprise revisions. Our first (Model 1) is a variant of the procedure pioneered by Brous (1992) and Brous and Kini (1993) who examine earnings forecast revisions following stock offerings and takeovers, respectively. We first choose 500 firms at random from the I/B/E/S data tape and then choose at random a 25-month period for each firm between January 1984 and December 1990. Using this pooled data, we estimated the following equation using a third-order Almon lag (*t*-values in parentheses),

$$
\begin{aligned}
(2) \qquad \mathrm{FR}_{i,t} \;=\; & \underset{(-15.20)}{-0.1265} + \underset{(21.20)}{0.1051}\mathrm{FR}_{i,t-1} + \underset{(35.72)}{0.0958}\mathrm{FR}_{i,t-2} \\
& + \underset{(27.21)}{0.0861}\mathrm{FR}_{i,t-3} + \underset{(24.04)}{0.0760}\mathrm{FR}_{i,t-4} + \underset{(24.23)}{0.0654}\mathrm{FR}_{i,t-5} \\
& + \underset{(10.83)}{0.0545}\mathrm{FR}_{i,t-6} + u_{i,t}.
\end{aligned}
$$

The significant negative intercept of -0.1265 confirms the prior finding that, ceteris paribus, analysts tend to reduce their forecasts over time.[5] The significant coefficients on the lagged FRs confirm the finding that, ceteris paribus, downward (upward) revisions in the median forecast tend to be followed by further downward (upward) forecast revisions as more analysts update. For instance, the 0.1 coefficient for $\mathrm{FR}_{i,t-1}$ indicates that a doubling of the median forecast one month tends to be followed by an increase of approximately 10% the following month.[6]

Using equation (2) and past values of FR, we calculate the expected forecast revision, $E(FR_{i,t}|FR_{i,t-j}, j = 1, 6)$. We then define the abnormal earnings forecast revision, $\mathrm{AFR}_{i,t}$, as the difference between the actual revision in the consensus forecast in month t and this expected forecast revision, specifically

$$
(3) \qquad \mathrm{AFR}_{i,t} \;=\; \mathrm{FR}_{i,t} - E(\mathrm{FR}_{i,t}|\mathrm{FR}_{i,t-j}, j = 1, 6).
$$

The AFRs defined using equations (2) and (3) (which we label Model 1 AFRs) assume that the analyst forecast revision process (equation (2)) is the same for all firms. That, if the median forecast falls $X\%$ one month, it will tend to fall another $0.1058X\%$ the following month, $0.0958X\%$ the next month, etc. Because analysts follow some firms more closely than others, it is possible that the time-series process differs from firm to firm. To allow for this possibility, our second procedure (Model 2), estimates separate versions of equation (2) for each firm using the median earnings forecast for that firm in months $t - 36$ through $t - 13$ and $t + 13$ through $t + 36$, where t is the month of the rating change. Using these estimated equations and the observed values of $\mathrm{FR}_{i,t-j}$ to estimate $E(\mathrm{FR}_{i,t}|\mathrm{FR}_{i,t-j}, j = 1, 6)$, we again define $\mathrm{AFR}_{i,t}$ using equation (3). While the Model 1 AFRs are based on more data, Model 2 minimizes the possibility of specification error.

B. Downgrade Results

Mean abnormal forecast revisions from 12 months before rating downgrades through 12 months after are reported in Panel A of Table 3. As expected, the *surprise* forecast revisions in Panel A of Table 3 are considerably smaller in absolute terms than the total forecast revisions in Panel A of Table 2. While the figures vary somewhat depending on which model is used to define the AFR,

[5] For a P/E ratio of 12 (the mean in our sample), the intercept implies a negative mean revision of -1.5% each month.

[6] We also estimated a model with longer lags. No lags beyond six were significant.

in both procedures the largest negative surprise forecast revision is observed in the month immediately following the downgrade. In addition, negative surprise earnings forecast revisions are observed from 10 months prior to the downgrade through at least six months after, but the surprise forecast revisions are small (and insignificant for Model 2) until three months prior to the rating change when they become large and consistently significant.

TABLE 3

Abnormal Earnings Forecast Revisions Before and After Bond Rating Changes

Month Relative to Rating Change	*Panel A. Downgrades*				*Panel B. Upgrades*			
	AFR Defined Using Model 1		AFR Defined Using Model 2		AFR Defined Using Model 1		AFR Defined Using Model 2	
	Mean	*t*-Value	Mean	*t*-Value	Mean	*t*-Value	Mean	*t*-Value
−12	−0.013	−0.29	0.099	1.03	0.117	1.94	0.058	0.99
−11	0.001	0.02	0.061	0.90	0.146	3.08**	0.022	0.34
−10	−0.109	−2.09*	−0.104	−1.47	0.104	2.21*	0.016	0.23
−9	−0.175	−2.88**	−0.155	−2.07*	0.207	2.83**	0.093	1.67
−8	−0.088	−2.03*	−0.045	−0.74	0.139	2.66**	0.082	1.12
−7	−0.119	−2.32*	−0.032	−0.52	0.145	3.99**	0.153	3.33**
−6	−0.159	−3.03**	−0.104	−1.55	0.042	0.63	0.096	1.39
−5	−0.145	−2.72*	−0.112	−1.44	0.126	2.61**	0.181	3.21**
−4	−0.080	−1.71	−0.034	−0.48	0.131	3.96**	0.180	4.23**
−3	−0.258	−4.16**	−0.204	−2.88**	0.204	6.54**	0.245	6.38**
−2	−0.240	−3.76**	−0.189	−2.68**	0.094	2.06*	0.143	2.66**
−1	−0.263	−4.33**	−0.210	−2.76**	0.109	1.96*	0.152	2.35*
Rating Change	−0.309	−4.22**	−0.300	−3.42**	0.218	4.17**	0.263	4.69**
1	−0.424	−5.41**	−0.415	−4.49**	0.136	2.93**	0.182	3.31**
2	−0.090	−1.23	−0.151	−1.82	0.201	4.38**	0.230	4.33**
3	−0.114	−1.53	−0.212	−2.50*	−0.003	−0.08	0.039	0.80
4	−0.301	−3.38**	−0.357	−3.46**	0.140	2.76**	0.152	2.46*
5	−0.123	−1.70	−0.214	−2.68**	0.143	4.85**	0.170	4.12**
6	−0.074	−1.14	−0.141	−1.70	0.029	0.97	0.081	2.52*
7	0.026	0.37	−0.036	−0.45	0.088	2.63**	0.136	3.50**
8	−0.017	−0.27	−0.012	−0.14	0.073	1.93	0.125	2.90**
9	−0.053	−0.77	−0.089	−1.11	0.055	1.53	0.096	2.46*
10	−0.150	−1.83	−0.179	−1.99*	0.082	2.79**	0.126	3.07**
11	0.064	0.90	0.055	0.63	0.076	1.36	0.118	2.20*
12	−0.094	−1.36	−0.092	−1.21	−0.010	−0.19	0.003	0.05
Obs.	623–629		623–629		384–389		384–389	

The mean abnormal, or surprise, forecast revision, $AFR_{i,t} = FR_{i,t} - E(FR_{i,t}|FR_{i,t-j}, j = 1,6)$ is reported where $FR_{i,t} = [(F_{i,t} - F_{i,t-1})/P_i^*] * 100$, $F_{i,t}$ is the median forecast in month t of earnings per share for the current fiscal year as reported by I/B/E/S, and P_i^* is the price per share six months prior to the rating revision. $E(FR_{i,t}|FR_{i,t-j}, j = 1,6)$ is the expected forecast revision in month t. In Model 1, $E(FR_{i,t})$ is based on a six-month distributed lag of past forecast revisions (equation (2) in text) estimated from a random sample. In Model 2, $E(FR_{i,t})$ is based on individual distributed lag equations estimated for each firm using data from $t - 36$ through $t - 13$ and $t + 13$ through $t + 36$. * and ** denote means that are significantly different from zero at the 0.05 and 0.01 levels, respectively, in two-tailed tests.

The significant negative post-downgrade AFRs, especially the large negative AFR in month $t + 1$, imply that downgrades Granger cause surprise negative forecast revisions. For a P/E ratio of 12, the approximate mean in our sample,

the Model 1 results imply a surprise downward revision in the consensus earnings forecast of roughly 5.1% in the first month following a downgrade and about 13.2% over the first four months.[7] These analyst reactions to downgrades are larger than the reactions to stock offerings and takeover announcements documented by Brous (1992) and Brous and Kini (1993), respectively. Apparently, stock analysts view downgrades as providing important new information about the firm's future earnings prospects.

The sizable and significant negative AFRs, which begin at least three months before the downgrade, imply that surprise negative forecast revisions also Granger cause downgrades. This is consistent with our finding in Table 1 that downgrades tend to follow periods of negative stock returns and indicates downgrades are at least partially a response to public information that both earnings analysts and the market already have.

Since several significant negative AFRs are observed long before and after bond downgrades, some may question whether the AFRs fully remove all serial correlation, that is, whether they truly represent surprise forecast revisions. To explore this possibility, we examined two other samples. First, from the I/B/E/S tapes, we chose, at random, 483 non-downgrade firms with pre-downgrade AFRs roughly equal to those of the downgrade sample.[8] In other words, we formed a sample of firms that apparently were the subject of similar negative pre-t news but that did not suffer a downgrade at time t. The resulting cumulative AFRs after applying Model 1, are graphed in Panel A of Figure 1 along with those of our downgrade sample. While the pre-month-0 AFRs of the two samples are roughly identical, the post-month-0 results are not. For the no-downgrade sample, the mean AFRs for months 0 through 6 vary around zero and are all insignificant. In summary, once we control for the earnings analysts' tendency to respond with a lag to negative information, we do not observe negative post-t AFRs unless the negative information is followed by a downgrade.

Second, we examined separately those downgrades without large negative pre-downgrade AFRs, i.e., firms that apparently were not the subject of negative information in months $t-6$ through $t-1$, by forming a subsample of our downgrade sample of those firms in which the cumulative AFR (Model 1) over the months -6 through -1 was within one standard deviation of zero (514 downgrades). The post-downgrade results for this subsample, which are shown in Panel B of Figure 1, mimic those of the entire downgrade sample. Again, a large (-0.315), negative, and significant $(t=-4.50)$ surprise forecast revision is observed in the month following the downgrade and negative AFRs are observed in months $t+2$ through $t+5$. In summary, analyst forecast revisions following a downgrade appear to be roughly the same whether or not the downgrade was pre-

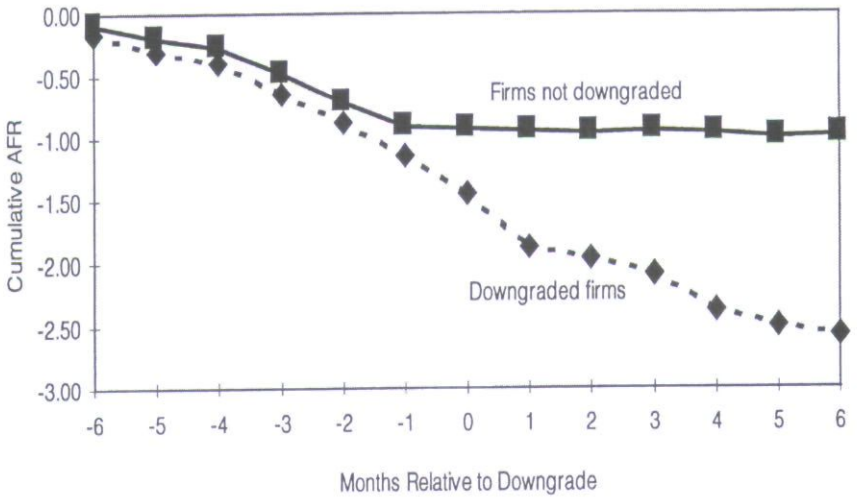
[7]The latter figure incorporates both direct effects (Table 2) and indirect effects (equation (2)). For instance, the estimated surprise forecast revision in the second month after a downgrade is $-0.090 + 0.1051(-0.424) = -0.135$. First term is the mean AFR for month $t+2$. The second term recognizes that, according to Table 2, the downgrade causes a downward revision of -0.424 in month $t+1$ and, according to equation (2), this would lead to a further downgrade.

[8]The cumulative AFRs for the downgrades in Table 2 are -1.14 over months -6 through -1 and -0.76 over months -3 through -1. From the random sample of non-downgrade firms, we chose firms whose cumulative AFRs over both periods were within one standard deviation of these two values.

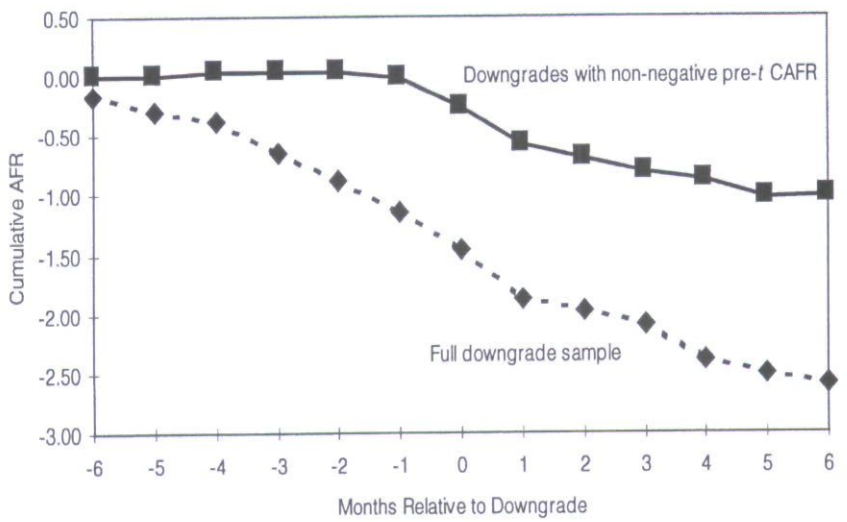
FIGURE 1

Comparisons of Cumulative Abnormal Earnings Forecast Revisions

Panel A. Comparison of Downgrades with a Random Sample of Firms with Negative Pre-t CAFRs That Were Not Downgraded



Panel B. Comparison of all Downgrades with a Subsample of Downgrades with Non-negative Pre-t CAFRs



ceded by other negative news. Both results in Figure 1 support the conclusion that our procedures control for the tendency for analyst forecasts to adjust slowly—so that the negative AFRs observed after downgrades represent a response to the downgrade and not a lagged response to pre-downgrade information.

C. Upgrade Results

Surprise forecast revisions before and after upgrades are reported in Panel B of Table 3. While the mean forecast revisions in Table 2 were small and insignificant, after we control for predictable forecast revisions, positive and significant AFRs are observed both before and after upgrades. Again, the implication is that Granger causality flows both ways, i.e., that upgrades tend to follow several months of positive forecast revisions by analysts but that analysts also tend to raise their forecasts following upgrades. The significant post-upgrade AFRs are somewhat surprising since we and others find no market response to upgrade announcements. Apparently, earnings analysts view upgrades as providing some new information while investors do not. Nonetheless, the analyst response to upgrades appears much more muted than the response to downgrades. While the Table 3 results (Model 1) imply that for a P/E ratio of 12, the consensus earnings forecast falls about 5.1% in the month following a downgrade and about 13.2% over four months, they imply a surprise rise of only 1.6% in the first month following an upgrade and only 6.9% over four months. Apparently, analysts, like the market, view upgrades to be less informative than downgrades.

D. Regression Results

In addition to tests of the mean AFRs in Table 3, we also conduct a regression test of the response of earnings analysts to downgrades and upgrades. Specifically, we estimate

$$(4)\quad \mathrm{FR}_{i,t} = \alpha_0 + \sum_{j=1}^{6} \alpha_j \mathrm{FR}_{i,t-j} + \sum_{j=1}^{5} \beta_j D\mathrm{dw}_{i,t-j} + \sum_{j=1}^{5} \gamma_j D\mathrm{up}_{i,t-j} + e_{i,t},$$

where $D\mathrm{dw}_{i,s} = 1$ ($D\mathrm{up}_{i,s} = 1$) if a rating downgrade (upgrade) is announced for firm i in month s and zero otherwise. The hypothesis that, ceteris paribus, analysts tend to lower their forecasts over time implies $\alpha_0 < 0$, while the hypothesis that the FRs are correlated because only a portion of the analysts update monthly implies $\alpha_j > 0$ for $j = 1, 6$. The hypothesis that downgrades Granger cause negative earnings forecast revisions implies $\beta_j < 0$, while the hypothesis that upgrades Granger cause upward forecast revisions implies $\gamma_j > 0$. Equation (4) is estimated using pooled data from $t - 24$ through $t + 24$. As in equation (2), the α_js are estimated using a third-order polynomial distributed lag.

Results are shown in the first two columns in Table 4. As expected, $\widehat{\alpha}_0 < 0$ and $\widehat{\alpha}_j > 0$ for $j = 1, 6$, confirming that analysts tend to be both overly optimistic and slow in revising their forecasts. Confirming that bond downgrades Granger cause downward earnings forecast revisions, all five $\widehat{\beta}_j$ are negative, and the null hypothesis that $\beta_1 = \beta_2 = \ldots = \beta_5 = 0$ is rejected at the 0.01 level.[9] Note that, for lags beyond one month, there is both a direct and indirect impact. For example, suppose a firm's bonds are downgraded in June. The coefficient of $D\mathrm{dw}_{i,t-1}$ implies that, ceteris paribus, FR falls by 0.4273 in July. Now, considering the

[9]For this test, we reestimated the equation without the five Ddw variables and constructed an F-test based on the difference in the unexplained sum-of-squares.

revisions in earnings forecasts occurring in August, the coefficient of $D\text{dw}_{i,t-2}$ implies that FR falls an additional 0.0973 (the direct effect). Since FR fell 0.4273 in July and the coefficient of $\text{FR}_{i,t-1}$ is 0.0734, the implication is that FR falls an additional $0.0734(0.4273) = 0.0314$ (the indirect effect). For a firm with a P/E ratio of 12, the coefficients in Table 4 imply that analysts tend to lower their earnings forecasts about 5.1% in the first month following a downgrade, and by about 15.8% over five months (counting both direct and indirect effects).

TABLE 4

Regression Tests of Whether Rating Changes Granger Cause Earnings Forecast Revisions

	Regression 1		Regression 2		Regression 3	
Variable	Coefficient	*t*-Value	Coefficient	*t*-Value	Coefficient	*t*-Value
Intercept (α_0)	−0.1714	−19.80**	−0.1582	−17.53**	−0.1576	−17.67
$\text{FR}_{i,t-1}$	0.0734	17.75**	0.0570	12.14**	0.0536	11.37**
$\text{FR}_{i,t-2}$	0.0894	40.05**	0.0781	29.23**	0.0773	28.91**
$\text{FR}_{i,t-3}$	0.0912	35.55**	0.0855	27.94**	0.0863	28.22**
$\text{FR}_{i,t-4}$	0.0786	30.16**	0.0791	26.09**	0.0807	26.58**
$\text{FR}_{i,t-5}$	0.0518	25.49**	0.0591	22.23**	0.0605	22.74**
$\text{FR}_{i,t-6}$	0.0106	3.26**	0.0253	5.24**	0.0257	5.33**
$D\text{dw}_{i,t-1}$	−0.4273	−6.17**	−0.3789	−5.50**	−0.3736	−5.43**
$D\text{dw}_{i,t-2}$	−0.0973	−1.40	−0.1090	−1.59	−0.1124	−1.64
$D\text{dw}_{i,t-3}$	−0.1201	−1.73	−0.0841	−1.23	−0.0861	−1.26
$D\text{dw}_{i,t-4}$	−0.3056	−4.41**	−0.3152	−4.65**	−0.3144	−4.64**
$D\text{dw}_{i,t-5}$	−0.1374	−1.98*	−0.1867	−2.77**	−0.1880	−2.79**
$D\text{up}_{i,t-1}$	0.1821	2.07*	0.2012	2.27*	0.1986	2.25*
$D\text{up}_{i,t-2}$	0.2473	2.82**	0.2455	2.81**	0.2452	2.81**
$D\text{up}_{i,t-3}$	0.0456	0.52	0.0387	0.45	0.0402	0.46
$D\text{up}_{i,t-4}$	0.1789	2.04*	0.1320	1.54	0.1284	1.50
$D\text{up}_{i,t-5}$	0.1871	2.31*	0.1625	1.91	0.1575	1.85
AEC_t					0.0152	8.36**
AEC_{t-1}			0.0227	12.63**	0.0234	13.01**
AEC_{t-2}			−0.0013	−0.71	0.0001	0.08
AEC_{t-3}			−0.0028	−1.53	0.0001	0.09
F-Stat. Downgrades	12.74**		12.10**		11.99**	
F-Stat. Upgrades	4.11**		3.74**		3.64**	

Variations of the equation

$$\text{FR}_{i,t} = \alpha_0 + \sum_{j=1}^{6} \alpha_j \text{FR}_{i,t-j} + \sum_{j=1}^{5} \beta_j D\text{dw}_{i,t-j} + \sum_{j=1}^{5} \gamma_j D\text{up}_{i,t-j} + \sum_{j=0}^{3} \theta_j \text{AER}_{i,t-j},$$

are estimated where $\text{FR}_{i,t}$ is the revision in month t of the median analyst forecast of firm i's earnings for the current fiscal year, $D\text{dw}_{i,s} = 1$ if a rating downgrade is announced in month s and zero otherwise, and $D\text{up}_{i,s} = 1$ if an upgrade is announced in month s and zero otherwise. $\text{AER}_{i,s}$ is a measure of the change in actual earnings for firm i announced in month s. $\text{AER}_{i,s} = 0$ if there is no earnings announcement in month s. * and ** denote significance at 0.05 and 0.01 levels, respectively, in two-tailed tests.

The five upgrade dummies all have positive coefficients and the null that $\gamma_1 = \gamma_2 = \ldots = \gamma_5 = 0$ is also easily rejected at the 0.01 level. Consistent with our earlier findings, however, the coefficients imply that analysts react less strongly to upgrades than to downgrades.

IV. Actual Earnings

Since downgrades apparently cause analysts to revise their earnings forecasts downward and since the market reacts negatively, a natural question is whether downgrades presage declines in actual earnings. Also, it is possible that the large surprise revisions in earnings forecasts documented in Tables 3 and 4 represent a reaction to other information that was released at roughly the same time as the rating changes (and may precipitate the rating change), rather than a reaction to the rating change per se. While we cannot control for all such information, we can explore the relations among rating changes, earnings forecast revisions, and actual earnings releases.

A. Actual Earnings Patterns around Rating Changes

In Table 5, we report changes in quarterly earnings per share measured as

$$\text{AEC}_{i,t} = \frac{(E_{i,t} - E_{i,t-3})}{P_i^*} * 100, \tag{5}$$

where $E_{i,t}$ represents the quarterly earnings per share figure released in month t, $E_{i,t-3}$, is the quarterly EPS figure (annualized) for the previous quarter, which carries the subscript $t - 3$ since it would normally be issued three months earlier, and (as before) P_i^* is the price per share six months prior to the rating revision. Mean values of AEC are reported from six months prior to the rating change through six months after it. Since actual earnings are not available on the I/B/E/S tapes for all firms, Table 5 is based on somewhat fewer rating changes than Table 3, e.g., 523 downgrades in Table 5 vs. 629 in Table 3. Further, since AEC is only calculated for months with earnings releases, the mean AEC for any one month is based on roughly one third of the total firms.[10]

Declines in quarterly earnings tend to be observed over the six months prior to downgrades. While the figures for most individual months from $t - 6$ through $t - 1$ are insignificant (partially due to the fact that only one-third of the firms release figures in a given month), the average AEC over this six-month period is significant at the 0.01 level. These negative pre-downgrade earnings changes are consistent with our finding (and that of prior studies) that downgrades follow periods of negative abnormal returns. They are also consistent with our finding that downgrades tend to follow negative revisions in analysts' earnings forecasts.

The significant negative AEC for month $t + 1$ indicates that rating downgrades prefigure bad earnings news. This is consistent with our earlier evidence indicating that earnings analysts regard downgrades as containing new negative information about the firm's future prospects as well as our finding of a negative reaction to the downgrade announcement. However, while analysts continue to

[10]Note that, while our FRs and AFRs were based on annual earnings forecasts, AEC is defined in terms of quarterly earnings. We have also calculated AEC using annual earnings (available on request). While the latter measure is consistent with our earnings forecast revision figures and contains less noise than quarterly earnings, it covers too long a period to be meaningful. For instance, the annual earnings figure released, for instance, three months after a rating change would begin nine months before the rating change.

TABLE 5

Changes in Actual Earnings Before and After Bond Rating Changes

Month Relative to Rating Change	*Panel A. Downgrades*			*Panel B. Upgrades*		
	Mean AEC	*t*-Value	Obs.	Mean AEC	*t*-Value	Obs.
−6	−0.306	−1.01	165	0.054	0.17	75
−5	−0.478	−1.27	189	0.057	0.12	97
−4	−0.515	−1.55	145	0.245	0.68	115
−3	−0.064	−0.21	179	0.093	0.28	86
−2	−1.011	−2.48*	169	0.556	1.19	98
−1	−0.760	−1.63	174	0.145	0.54	125
Rating Change	−1.352	−3.11**	181	−0.053	−0.15	98
1	−0.958	−2.84**	185	0.328	1.10	112
2	0.625	1.07	170	−0.123	−0.28	120
3	0.575	1.09	173	−0.435	−1.65	94
4	−0.167	−0.32	210	0.415	1.50	133
5	0.106	0.22	172	0.835	1.93	120
6	−0.334	−0.59	198	0.191	0.59	111

The mean change in actual earnings, $AEC_{i,t} = (E_{i,t} - E_{i,t-3})/P_i^* * 100$, is reported where $E_{i,t}$ is the quarterly (annualized) earnings per share figure reported that month, and P_i^* is the price per share six months prior to the rating revision. AEC is only calculated for firms with earnings announcements that month. * and ** on the *t*-values denote means that are significantly different from zero at the 0.05 and 0.01 levels, respectively, in two-tailed tests.

revise their forecasts downward for months following a downgrade, the downgrade appears to only foreshadow earnings in the near future in that the AECs after month $t + 1$ are insignificant and some are positive.

Interestingly, there is no perceptible earnings pattern following upgrades (or before, for that matter), which is consistent with the prior evidence that the market reacts to downgrades but not upgrades, but leaves unexplained why analysts tend to raise their forecasts in response to upgrades.

B. Surprise Forecast Revisions

Since declines in actual earnings tend to be observed prior to and roughly simultaneously with downgrades, it is possible that the negative post-downgrade AFRs observed in Panel A of Table 3 represent a lagged reaction to this information, rather than the downgrade per se. To test whether the post rating change AFRs documented in Tables 3 and 4 can be explained by actual earnings releases, we add lagged measures of the change in actual earnings to the Table 4 regressions. First, we add the three additional independent variables, $AER_{t,t-1}$, $AER_{i,t-2}$, and $AER_{i,t-3}$ to the regression described in equation (4) where

$$\begin{aligned} AER_{i,t} &= AEC_{i,t} \text{ if quarterly earnings for firm } i \text{ are announced in month } t \\ &= 0 \qquad \text{if there is no earnings announcement in month } t. \end{aligned}$$

Since quarterly earnings are normally announced every three months, normally one and only one of the lagged AER terms takes a non-zero value. Ideally, we would prefer to include only the *unexpected* change in actual earnings, but this is not possible since we only have annual and no quarterly forecasts of earnings.

Results are in Regression 2 in Table 4. As expected, the coefficient of $AER_{i,t-1}$ is positive and significant ($t = 12.63$), implying that analysts do revise their forecasts of future earnings in response to releases of actual earnings numbers. While $AER_{i,t-1}$ is strongly significant, $AER_{i,t-2}$ and $AER_{i,t-3}$ are not and even take negative coefficients, which is not necessarily surprising since the lagged response should be captured by the lagged FR terms. In other words, if a decline in quarterly earnings is announced in July, the coefficient of $AER_{i,t-1}$ implies that analysts tend to revise their annual earnings forecasts downward in August. The coefficients of the lagged FR terms imply that the median earnings forecast tends to continue to fall in September, October, and future months as other analysts update.

Most importantly, the coefficients of the dummy variables for lagged rating changes are little changed. The coefficients of the lagged downgrade dummies are all still positive and the null hypothesis that all five are equal to zero is rejected at the 0.01 level. Likewise, the coefficients of the lagged upgrade dummies are still all positive and they are also significant as a group at the 0.01 level. Consequently, the earnings forecast revisions following rating changes appear to be a reaction to the rating change itself, not a reaction to earnings information released at roughly the same time.

In the final regression in Table 3, we add any contemporaneous earnings release to the equation. Within month t, it is unclear which comes first: the earnings release, the rating change, or the revision in the analysts' earnings forecast. Consequently, we initially exclude earnings releases in month t. However, to maximize the role of actual earnings releases and minimize the role of rating changes, we add $AER_{i,t}$ to the equation as a final test. This would be appropriate if the actual earnings release precedes both the rating change and the analysts' forecast revisions. Note that, according to the evidence in Table 5, $AER_{i,t}$ is partially predictable from $Ddw_{i,t-1}$, so this procedure biases the results against finding that $Ddw_{i,t-1}$ has predictive content regarding $AFR_{i,t}$. As shown in the final column in Table 4, $AFR_{i,t}$ is significantly related to $AER_{i,t}$, but is still strongly and significantly related to the lagged rating change dummies.

In summary, we find that actual earnings fall following downgrades but do not rise following upgrades, and that, while revisions in analysts' earnings forecasts are influenced by prior releases of earnings numbers, the apparent reaction of earnings analysts to downgrades and upgrades cannot be explained as a lagged response to the release of actual earnings numbers.

V. Conclusions

We have explored the relative information provided to the equity market by bond rating agencies and earnings analysts. Although downgrades are partially a response to information that both earnings analysts and the market already have and have impounded in earnings forecasts and market prices, respectively, we find that they are clearly viewed by market participants as providing some new information since negative post-downgrade returns are observed. Moreover, analysts apparently view the downgrades as having negative implications for the current year's earnings since they respond by revising their forecasts sharply downward.

This appears to be a reaction to the downgrade itself—not to earlier negative information or contemporaneous earnings numbers. Moreover, the surprise forecast revision following downgrades is stronger than the revisions that previous studies have documented following other informational events.

Our evidence indicates that the market impounds downgrade information much more quickly and efficiently than analysts do since, while market returns show no post-downgrade pattern, analysts are still revising their forecasts months later. Moreover, we find that downgrades do presage declines in actual earnings.

In contrast to downgrades, upgrades appear to be purely a response to information that the market already has since there is no market response, since the upgrades follow both periods of positive returns and upward earnings forecast revisions, and since there is no evidence that actual earnings rise following upgrades. Nonetheless, upgrades are followed by upward revisions in analysts' earnings forecasts. However, these upward forecast revisions are considerably less than the surprise downward revisions following downgrades. It appears that either the rating agencies expend more resources in detecting deteriorations in a firm's financial position than they do in detecting improvements or that the firms themselves communicate good news, but not bad news, to the market.

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