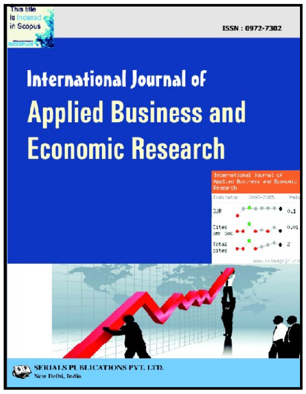

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The Informativeness of Credit Watch Placement on Bond Rating Revision

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Abstract: This paper investigates stock price reaction to credit watch placement in bond rating revision process. We find that placing a credit watch causes significant abnormal returns in the company's stock. In other words, investors seem to concern more on the event of the company being put of a watchlist than the event of bond rating change itself. Moreover, the inclusion of credit watch placement considerably reduces stock price's volatility at the time of actual rating revision and mitigate the subsequent pricedrift after rating downgrade. We further show that credit watch placement has a greater impact on firm with a highdegree of information uncertainty measured by idiosyncratic volatility, firm's size, age and analyst dispersion. Overall, our findings accentuate the importance of credit watch placements in the overall fabric of credit ratings adjustments.

JEL Classification: G11, G14, G24.

Keywords: credit rating agency, credit watch placement, bond rating, abnormal returns, long run abnormal returns.

INTRODUCTION

Beginning in 1992, Moody's implemented a credit issue on a credit watch (also known as watchlist) preceding to an actual bond rating revision. This practice targets to provide investors with a guideline for possible roadway and scheduling of anticipated credit rating changes.The keystones of a corporation's bond being put on a credit watch is to notify investors of the rating agency's opinion that the credit quality of the firm, may be altering, consequently decreasing the company's stock price volatility by gradually transferring its credit ratings in retort to changes in the essential credit quality of the credit obligation. The credit watchlist has been utilized widely as the meter of possible guiding for change in credit rating. A large portion of bond rating changes are headed by credit watch placement. However, most current literature studying the impact of bond rating changes ignores credit watch and only explores the event of actual bond rating change in the bond rating process. Most market participants often view credit watch placement as a more substantial credit rating event than the actual bond rating revision.

To date, our knowledge of the impact of bond rating changes is limited to empirical evidence from actual bond rating changes (see, *e.g.*, Dichev and Piotroski 2001; Ederington and Goh 1998; Grier and Katz 1976; Glascock, Davidson, and Henderson 1987; Goh and Ederington 1993; Griffin and Sanvicente 1982; Hettenhouse and Sartoris 1976; Hite and Warga 1997; Katz 1974; Pinches and Singleton 1978). This limitation leaves many important questions unanswered: What, if any, information does credit watch placement convey about the change in firm's credit quality? What, if any, is the impact of credit watch placement on the information contents of bond rating change? Does credit watch placement reduce investor underreaction following bond rating change, in particular, bond downgrade? When does credit watch placement have a significant impact on stock price?

Our previous work (Chiyachantana *et al.* 2014) comprehensively investigates the whole process of bond rating revision by including the event of a credit watch placement into the analysis in addition to the event of an actual rating change. This inclusion allows us to clearly observe the significant impact of credit watch in this entire process of bond rating revision on the stock market. Essentially, our previous work has addressed the little-studied question of how a placement in the watchlist affects the information content of bond rating revisions.

We are not the first to realize the importance of credit watch placement in the study of bond rating revision.Holthausen and Leftwich (1986) and Hand, Holthausen, and Leftwich (1992) examine the impact of credit watch placements on security prices and report small but significant market reactions of –0.79% around negative credit watch placement. However, both studies, apart from being over two decades old, are based on a small sample of credit watchlist firms (N = 127). Whether their conclusions can be generalized to the current markets, which have undergone a sea change in the intervening 25 years, is unclear. More importantly, the data used by past researchers have no information on credit watch resolutions.[2] The resolution (in terms of ratings changes) following a bond being placed on the credit watchlist is important because it allows the researcher to measure the overall impact of the credit watch as a tool to reduce price impact prior to the rating change. We incorporate this important information in our analysis.

In this paper, we extend previous literature by focusing on bond rating downgrade, which deemed to be the most important tool to signal investors of the deterioration of a firm's credit worthiness. We answer the above questions using a comprehensive and unique data set on all credit rating actions provided by Moody's over a 13-year period from October 1992 to December 2005. This study provides three stages of empirical results. In the first stage, we investigate how market reacts to the event of credit watch placed on company's bond rating associated with various firm's characteristics. The results shows the importance of integrating credit watch placement in the study of bond rating changes. Credit watch is viewed as a signal of an upcoming rating revision: We found that almost 50% of bond downgrades are accompanying with prior placement on a negative watch. In addition, a publicly traded company's bond, being placed on a watchlist seems to comprise more information than the bond rating change. We find that the stock price reaction to the event of being placed on a negative credit watch results in an average cumulative abnormal return (CAR) of –3.34% over a three-day period centered on the watchlist event, compare with an abnormal equity return of –2.30% associated with the actual bond rating downgrade event.

Moreover, we inspect how credit watch placement affects the information content of bond rating revision by explicitly connecting the event of a credit watch placement to the event of a rating revision. The credit watch placement reduces the company's stock price volatility at actual bond rating changes. In other words, the market response of –3.24% at the rating downgrade event without prior credit watch is decline to –1.35% when headed by credit watch placement.

In the second stage of our analysis, we extend previous work by examining how credit watch placement affects investor underreaction following bond downgrades. Our empirical test is motivated by a Dichev and Piotroski's (2001) prominent study on long-run abnormal returns following bond rating change. They report a significant price drift in the first year following a rating downgrade, which they attribute to investors' underreaction to information contained in the announcement of bond rating changes. The act of including a credit issue on the watchlist allows longer time before actual rating change for investors to assimilate better information and should subsequently reduce long-run underreaction. In addition, the announcement of credit watch placement adds information to the market and therefore lower investors' confidence to their private signals. Consequently, we conjecture that investor underreaction should be less (more) severe if the bond downgrade is preceded (not preceded) by inclusion on a credit watch.

We extend Dichev and Piotroski (2001)'s empirical model by partitioning the sample according to prior credit watch placement. We employ three methods to examine the impact of credit watch placement on investor underreaction following bond rating downgrade. First, we follow Dichev and Piotroski (2001) to calculate CARs and buy and hold returns (BHARs) while controlling for both size and book-to-market ratio. Second, we employ Ibbotson's (1975) returns across time and securities (RATS) method with Carhart's (1997) four factors model. Finally, we calculate underreaction coefficients using the method introduced by Cohen and Frazzini (2008). Our findings from all three approaches provide unambiguous supportfor the usefulness of credit watch placement in attenuating investor underreactionfollowing bond downgrades. In sum, we find that the inclusion of credit watch placement significantly reduces price drift following rating downgrades. In particular, 12-month abnormal returns for bonds downgraded with a negative watch placement are significantly lower than those of bonds downgraded without a negative credit watch by approximately 8%.

In the third stage of our analysis, we try to find when and why credits watch placements have the most significant impact on stock prices during the bond downgrade and post-event periods. We conjecture that the informativeness of credit watch placement varies across firms depending on the degree of firm's information uncertainty (IU).[3] Specifically, if credit watch placement helps resolve uncertainty about future rating revision, then the effects should be most pronounced in the firms whose information is difficult to acquire by investors. We adopt four widely used IU measures as proxies for information availability: idiosyncratic volatility (IVOL), firm size (SIZE), firm age (AGE), and analyst dispersion (DISP). Our findings indicate that market reactions to rating events and post-downgrade events are consistently higher in high IU than in low IU firms and that credit watch placement plays an important role in diminishing abnormal returns around bond downgrade and post-downgrade abnormal returns in the high IU firms. Finally, our findings from cross-sectional multivariate regressions reinforce the informational effect of credit watch placements. Inclusion on a negative watch list has an economically and statistically significant impact on abnormal returns around bond downgrade and post-downgrade abnormal returns, and the information effects of credit watch are most pronounced in high IU firms.

This paper provides various contributions to the existing literature. First, we analyze the overall process of the bond rating revision by including credit watch placement and the subsequent rating change in the analysis. This allows us to clearly understand the role of credit rating agencies in producing fundamental credit quality of the credit obligation. Second, we establish an event study that incorporates the information built in the credit watch resolutions to correctly connect to the successive bond rating changes. Third, we investigate when and why credit watch placements potentially affect stock prices. Our findings highlight the importance of firm's IU in explaining market reactions to rating events and post-downgrade abnormal returns.

Our study has several academic and practical implications. From the academic perspective, our findings underscore the importance of credit watch placements in the overall fabric of credit ratings adjustments. Failing to incorporate credit watch placement into bond rating analysis could potentially result in the underestimation of the impact of bond rating revisions. From a practical perspective, investors can use credit watch placement as a credible signal of future rating revision. More important, in light of the recent subprime mortgage crisis and European sovereign debt crisis, the demand for timely credit quality information is increasing, and credit rating agencies can utilize credit watch placement as an early warning mechanism to an impending change in credit quality, thereby reducing the impact

Bond Rating Process and Credit Watch Placement

Moody's generally allocates credit ratings for issuers of definite types of debt obligations. Ratings represent sentiments of future comparative creditworthiness and the ability to service and pay back a loan, developed by fundamental credit analysis and stated as Aaa to C symbol. Moody's employs the fundamental factors and important business drivers applicable to an issuer's risk profile to analyze the issuers' credit. In the rating process, Moody's analyst will collect evidence to evaluate risk exposed to investors who might own or buy those securities. The committee will assigned the appropriate rating. The rating will be continuously monitored to control whether the rating remains proper. If the analyst finds evidence that may result in a rating change, Moody's may adjust the rating and notify the market for rating change. This process is based on ongoing discussion and meeting between the issuer and Moody's analysts. When the rating is issued, Moody's continuously watched and updated over dialogues and regular meetings and issuers are stimulated to nurture any concern and present all relevant materials.

Moody's started placing certain bonds on a watchlist in 1992 to designate the probable direction and timing of future credit rating changes. If any changing situations reason ambiguities in the assumptions or records that support the current rating, Moody's may place the rating under review (*i.e.* on the watchlist). The purpose of placing the watchlist to lessen volatility and promote the stability of the rating process. The watchlist emphasizes issuers whose rating is on review for potential upgrade, downgrade, or direction undefined. A formal set of rating committee will place an issuer on the watchlist, while another separate rating committee will remove the watchlist. Normally, rating agencies change or confirm the current rating within 90 days of placing an issuer on the watchlist.

Data and Sample Characteristics

Four databases: Moody's Default Risk Service data, Center for Research in Security Prices (CRSP), CRSP–COMPUSTAT Merged File, and I/B/E/S are collected for this study. Specifically, we use the sample of credit watch placements and bond rating changes from October 1, 1992 to December 31, 2005, provided by the Moody's Default Risk Service database. The objective of a credit watch placement is to provide a suggestion of the probable direction of a future credit rating changes. Thus, the database contains the beginning date, suggestions, and the ending date of a credit watch placement and its succeeding rating change. A credit watch is labelled either positive (possible upgrade), negative (possible downgrade), or developing (uncertain direction).

To preserve the reliability of the data set and eliminate possibly polluting factors, we apply five screening rules. First, we confine our sample to U.S. domestic taxable corporate bonds and exclude bonds issued via private placement and Yankee bonds. Second, we exclude credit watch placements and bond rating changes associated with other news announcements because our study's objective is to examine the impact of rating actions as a result of change in credit quality.[4] Third, we exclude credit watch announcements associated with an uncertainty implication because it does not provide a clear signal about a credit rating's future direction.[5] Fourth, we count each bond rating change and credit watch announcement as one observation. We refer this method of selection in the subsequent discussion as a linked sample. Fifth, if a rating change and a credit watch relate to multiple bond issues by the same issuer, we consider only that issue with the largest magnitude of the rating change and subsequent rating change for credit watch, respectively, because that particular bond issue is likely to have the greater impact on stock prices.

We collect information on daily and monthly stock returns, value-weighted index returns, delisting returns, volume, and shares outstanding from the CRSP database. Returns are missing in CRSP data for many stocks delisting from the exchange. Each year, many stocks are delisted and ceased to be traded in the exchange. Delisting occur for a number of reasons including merger and acquisition, bankruptcy, liquidation, and migration to another exchange. We follow Shumway (1997) and Shumway and Warther (1999) to resolve missing returns problems and replace missing returns with –30% and –55% for NYSE/AMEX and NASDAQ, respectively.

Table 1 reports the number of credit watch placements and bond rating changes from 1992 to 2005. Our sample includes 729 downgrades with prior credit watch and 731 downgrades without prior credit watch. Downgrades with prior credit watch are 50% of total downgrades. These results indicate that the credit rating agencies frequently use the watchlistas a tool to indicate the direction and timing of an impending ratings change and confirm the importance of this study.

This table presents the number of linked and surprise credit rating changes by calendar year. Linked credit rating change is credit rating change with prior credit watch placement. Surprise credit rating change is credit rating change without prior credit watch placement. Data on Moody's credit rating are obtained from Moody's Corporate Default Risk Service database. The analysis covers time period from October 1992 to December 2005.

Table 2 presents descriptive statistics for variables of interest. The mean cumulative abnormal return around rating revision is –2.30% while the mean 12-month long-run return following rating revision is -6.85%. The market value ranges from$1,089,000 to $262 billion. Firm age ranges from 6.79 to 957.99 months. Analyst forecast dispersion ranges from 0% to 73%.

Idiosyncratic volatility (IVOL) is calculated as the average monthly idiosyncratic risk during the prior quarter before portfolio formation. Firm size (SIZE) is the market capitalization at the bond rating change date. Firm age (AGE) is the number of months since the firm was first covered by CRSP. Analyst dispersion (DISP) is the standard deviation of analyst forecasts in month of bond rating change. WATCH is credit

Table 1
Sample Descriptions on Number of Linked and Surprise Credit Rating Changes

Year	*Number of Linked Downgrade*	*Number of Surprise Downgrade*	*Total Downgrade*	*% Linked Downgrade*
1992	10	13	23	43
1993	35	28	63	56
1994	33	33	66	50
1995	33	47	80	41
1996	43	43	86	50
1997	34	55	89	38
1998	40	71	111	36
1999	54	64	118	46
2000	67	72	139	48
2001	88	110	198	44
2002	121	66	187	65
2003	85	46	131	65
2004	44	41	85	52
2005	42	46	88	48
Total	729	735	1464	50

watch dummy variable that equals 1 if rating change is preceded by credit watch placement and zero otherwise. Rate Change is the cumulative abnormal return around the rating revision. CAR is 12-month long-run abnormal return following rating revision.

Panel B shows the correlation matrix. The cumulative abnormal return around rating revision is positively correlated with firm size, age, and analyst dispersion. The cumulative long-run return is positively correlated with firm size and age. For information uncertainty proxy, firm size and firm age are positively correlated with each other and negatively correlated with idiosyncratic volatility and analyst dispersion. None of the proxy is highly correlated with each other so these proxies might capture different aspects of information uncertainty.

METHODOLOGY AND EMPIRICAL RESULTS

We provide the empirical findings in three stages. First, we examine the CARs surrounding a credit watch placement event and the subsequent bond rating change. Second, we estimate the long-term abnormal returns and the underreaction coefficients following the bond downgrade to measure investor underreaction. Third, we examine the role that a firm's IU contributes to the underreaction and investigate the cross-sectional variation in the effect of credit watch placements on abnormal returns around bond downgrade and long-term post-downgrade performance.

Information Content of Credit Watch Placement and Bond Rating Changes

To ascertain whether a credit watch placement is an informative event related to the underlying company, we examine the market response for the event windows of the credit watch placement and the bond rating

Table 2
Descriptive Statistics

Panel A: Descriptive Statistics

Variable	*N*	*Mean*	*Std*	*Min*	*Max*
Rate Change	1460	–2.30%	12.30%	–122.53%	127.00%
Car	1460	–6.85%	66.14%	–337.58%	369.78%
Ivol	1418	15.89	15.23	1.05	107.02
Size	1460	6016126	20871364	1089	262509809
Age	1445	300.28	253.89	6.79	957.99
Disp	1220	0.39%	2.51%	0	73%
Watch	1460	0.5	0.5	0	1

Panel B: Correlation Matrix (Pearson Correlations Are Shown above the Diagonal with Spearman Below)

Variable	*Rate Change*	*Car*	*Ivol*	*Size*	*Age*	*Disp*	*Watch*
Rate Change	1	–0.03074	–.28171	0.03438	0.08441	0.00858	0.07714
Car	0.02527	1	–0.07704	0.04709	0.12348	–0.03305	0.06688
Ivol	–0.19552	–0.13436	1	–0.17430	–0.27043	0.02045	–0.14955
Size	0.16357	0.20653	–0.64156	1	0.07368	–0.04064	–0.09288
Age	0.11526	0.16162	–0.38529	0.44243	1	0.00124	0.21664
Disp	–0.08247	–0.07757	0.33990	–0.49888	–0.16867	1	–0.04695
Watch	0.07735	0.07061	–0.15317	0.21706	0.20757	–0.00038	1

change using standard event study methodology. We calculate CARs over each three-day event window (–1, +1) centered on day 0 of the credit watch and the bond rating revision. The returns are calculated as follows.

$$r(t) = \left(\frac{p(t)}{p(t')} \right) - 1 \qquad \text{...(1)}$$

where $r(t)$ = return on purchase at t', sale at t

$p(t)$ = last sale price or closing bid/ask average at time t

$p(t')$ = last sale price or closing bid/ask average at time of last available price < t

Abnormal (excess) stock returns are computed as the difference between the daily raw stock return and the concurrent value weighted NYSE/AMEX/NASDAQ index return.

$$AR(t) = r(t) - e(t) \qquad \text{...(2)}$$

Table 3 reports the CARs for the credit watch placement (–1CW, +1CW), and bond rating changes (–1RC, +1RC). The first row reports the average stock CARs for all rating downgrades. The average CAR around the rating downgrade of –2.30% (t-stat = –7.13) is generally consistent with prior research, which reports significant negative price response to ratings downgrade. In the second and third rows, we breakdown the sample into two groups conditional on whether a credit watch placement occurs prior to the credit rating changes. We refer rating changes without (with) prior credit watch placement as surprise (linked) downgrades. The last row shows the CARs difference between linked and surprise ratings changes.

Table 3
Moody's Cumulative Abnormal Returns around Event Period

		Negative Watch and Bond Downgrade	
	Obs. (n)	*Credit Watch CAR (%)*	*Rating Change CAR (%)*
All Downgrade	1,460		–2.30%***
			(–7.13)
Linked Downgrade	729	–3.34%***	–1.35%***
		(–6.83)	(–2.98)
Surprise Downgrade	731		–3.24%***
			(–7.11)
Difference:			–1.89%***
Surprise – Linked			(–2.95)

This table reports cumulative abnormal returns (CARs) for linked sample of credit watch placements and bond rating changes for event window of credit watch placement (–1 to 1, where day 0 denotes the day of the credit watch placements), and event window of bond rating changes (–1 to 1, where day 0 denotes the day of the bond rating changes). CAR is defined as stock return minus the contemporaneous return on the value-weighted market portfolio. The last row shows the difference and test statistics of CARs between linked and surprise event. The sample period is from October 1992 to December 2005. Linked rating change is rating change that is preceded by credit watch placement. Surprise rating change is the rating change without prior credit watch placement. *** indicates significance at the 1% level. t-statistics are reported in the parentheses.

To determine whether credit watch provides new information to the financial markets, we analyze the abnormal returns around the event of the credit watch. If the act of being included on a credit watch conveys new information to the market, we should observe a significant reaction on stock prices that corresponds to the placement of the company's bond on the credit watchlist. We find that the market reaction at credit watch placement is striking. The CARs associated with negative credit watch inclusions are economically and statistically significant at –3.34% (*t*-stat -6.83).Our evidence on abnormal returns strongly supports the importance of credit watch placements in providing essential information to market participants.

To determine whether inclusion on credit watch works to reduce the uncertainty and the informational asymmetry surrounding a material change in a firm's credit quality, we examine the market reaction surrounding the bond rating change, conditional on prior credit watch placement. Recall that the rationale of a credit watch placement is to inform investors of the rating agency's opinion that the credit quality of an obligation, or obligor, may be changing, thereby reducing the company's stock price volatility by moving its credit ratings in a gradual, even predictable, fashion. This volatility may be eminent in the case of a bond downgrade in which investors react strongly to a downward change in credit quality. The credit watch serves to inform market participants of the upcoming significant rating change and reduces the stock market's reaction to the information content underlying the forthcoming rating revision. If so, we expect to see a smaller market reaction surrounding bond rating changes following inclusion on a credit watch relative to bond rating changes without inclusion on the watchlist.

Consistent with our expectation, the announcement period abnormal returns are larger for bond rating changes with no prior credit watch placements. The abnormal stock returns for bond downgrade are –3.24% for rating changes with no prior credit watch relative to –1.35% for rating changes associated with a prior credit watch. Our findings suggest that placement on a credit watch attenuates the market's impact associated with the corresponding stocks in the event of the bond rating change itself.

Credit Watch Placement and Investor Underreaction

Next, our analysis focuses on the extent to which credit watch placement helps assimilate credit rating information and thus reduces investor underreaction following bond downgrade. To carry out our tests, we partition the sample of downgraded firms into surprise downgrades and linked downgrades and track post-event abnormal returns following rating downgrade. We employ three methods to examine post-event abnormal returns. First, we follow Dichev and Piotroski (2001) to calculate post-event returns using CARs and BHARs. This method allows us to compare our findings directly to their study. Second, we use Carhart's (1997) four-factor model in Ibbotson's (1975) RATS framework. Finally, we calculate underreaction coefficients as proposed by Cohen and Frazzini (2008).

Post-event returns: CARs and BHARs. Following Dichev and Piotroski (2001), we report both CARs and BHARs.[6] To control for size and book-to-market ratio when calculating post-event returns, we form 25 (5 × 5) value-weighted portfolios of all NYSE, AMEX, and NASDAQ stocks based on their size and book-to-market in each calendar month starting in October 1992. We divide the monthly cross sections into size quintiles.[7] Within each size quintile, we form five book-to-market portfolios.[8] Based on the size and the book-to-market quintile cutoff, for each month we assign all firms into one of the 25 (5 × 5) portfolios and calculate value-weighted returns. At the end, for each month of our sample period, we have 25 portfolio returns stratified by size and book-to-market characteristics. We assign firms with bond ratings changes monthly into one cell of the 5 × 5 size and book-to-market matrix of benchmark portfolios. We then calculate both post-event CARs and BHARs.[9]

The first two columns of Table 4 present 12-month post-event CARs and BHARs. First, consistent with Dichev and Piotroski (2001), we observe a strong price drift following rating downgrade. The 12-month post-event CAR following rating downgrades is –6.85% (*t*-stat = –3.96). The mean post-event BHAR of –6.43% is slightly less than the CARs but is still statistically significant. Second, the inclusion of credit watch placement significantly reduces price drift following rating downgrades. The 12-month post-event CAR (BHAR) for the linked downgrades is –2.42% (–2.88%), which is significantly less than that of the surprise downgrades of –11.26% (–9.99%). The difference of –8.84% (–7.11%) is economically and statistically meaningful. Our results are consistent with the notion that credit watch placement helps assimilate credit rating information to the financial market and thus reduces investor underreaction following bond downgrade.

Table 4
Post-Event Cumulative Abnormal Return and Underreaction Coefficients

	12–Month Abnormal Returns						
	CAR		*BHAR*		*RATS*		*URC (%)*
Total Downgrade	–6.85%	***	–6.43%	***	–5.95	***	45.4
	(–3.96)		(–3.95)		(–3.03)		
Linked Downgrade	–2.42%		–2.88%		–1.09		66
	(–1.17)		(–1.39)		(–0.45)		
Surprise Downgrade	–11.26%	***	–9.99%	***	–9.75	***	22.2
	(–4.08)		(–3.98)		(–3.13)		
Difference:	–8.84%	***	–7.11%	**	–8.66	**	
Surprise-Linked	(–2.56)		(–2.19)		(–2.20)		

This table reports cumulative abnormal returns (CARs), buy-and-hold abnormal return (BHAR), Ibbotson's (1975) returns across time and securities (RATS) CARs, and underreaction coefficients following bond rating change. Linked rating change is rating change that is preceded by credit watch placement. Surprise rating change is the rating change without prior credit watch placement. CAR is defined as monthly stock return minus the corresponding monthly return for the matching size and book-to-market portfolio. BHAR is defined as the buy-and-hold raw return for the appropriate horizon minus the buy-and hold return for a benchmark portfolio matched on size and book-to-market. RATs CARs are the abnormal performance using Ibbotson's RATS methodology and applying the Fama and French's (1993) three-factor model plus Carhart's (1997) momentum factor. Underreaction coefficient (URC) is event date reaction divided by the total reaction (event date reaction plus post-event return).The sample period is from October 1992 to December 2005. ** and *** indicate significance at the 5% and 1% levels, respectively. t-statistics are reported in the parentheses.

Ibbotson's (1975) RATS with Carhart's (1997) four-factor model. We employ the RATS method proposed by Ibbotson, assuming that normal returns are generated using Fama and French's (1993) three-factor model with Carhart's momentum factor. We run the regression for every month j relative to the event month 0 (j = 1,….., 12):

$$(R_{i,t} - R_{f,t}) = a_j + b_j(R_{m,t} - R_{f,t}) + c_j SMB_t + d_j HML_t + e_j MOM_t + \varepsilon_{i,t}, \quad ...(3)$$

where $R_{i,t}$ is the monthly return on security *i* in month *t*. $R_{f,t}$ and $R_{m,t}$ are the risk-free rate and the return on the equally weighted CRSP index, respectively. SMB_t, HML_t, and MOM_t are, respectively, monthly return on the size, book-to-market, and momentum factor in month *t*. The CARs reported are sums of the intercepts of cross-sectional regression over the 12-month periods.

The third column of Table 4 presents 12-month post-event CARs using RATS methodology. The results have similar pattern to post-event CARs and BHARs. The result further confirms our hypothesis that credit watch helps to attenuate investor underreaction. Specifically, the post-event CARs for surprise downgrades using the RATS method are –9.75% relative to a much smaller return of –1.09% for linked rating changes with the difference of –8.66% (*t*-stat = –2.20).

Underreaction coefficients. We follow Cohen and Frazzini (2008) to calculate anunderreaction coefficient (URC) as a measure of the initial price response to an event as a fraction of the subsequent abnormal return,

$$URC = \frac{ER}{(ER + SR)}, \quad \text{...(4)}$$

where ER is the event period return and SR is the subsequent return.[10] A URC of less than 1 represents underreaction, and other positive number represents overreaction. Among cases of underreaction, lower underreaction coefficients indicate more severe underreaction.

The last column of Table 4 presents URCs. The results are consistent with our expectation that surprise (linked) downgrades are associated with more (less) severe underreaction. The URC of linked downgrades is 66.0% whereas the URC of surprise downgrades is only at 22.3%. The result indicates that 66.0% of one-year returns occur on the credit watch and rating change event period for linked downgrades, compare to 22.3% for surprise downgrades. In sum, all three approaches reach the same general conclusion that supports the benefit of credit watch placement in reducing investor underreaction following the bond downgrades.

IU and Information Content of Bond Rating Change

We now examine the extent to which the impact of credit watch placement varies according to information available at the time of announcements. Following Zhang (2006), we use IU to proxy for information availability in the market. By definition, high IU firms are those firms that are more difficult and more costly about which to acquire information. We adopt four widely used variables as proxies for information availability: idiosyncratic volatility (IVOL), firm size (SIZE), firm age (AGE), and analyst dispersion (DISP).

We calculate idiosyncratic volatility as the average monthly idiosyncratic risk during the prior quarter before portfolio formation. Following Fu (2009), we define idiosyncratic volatility each month as the product of

(a) the standard deviation of the regression residuals of excess daily returns on the daily Fama-French (1993) three factors and

(b) the square root of the number of observations in the month.[11]

Firm size is another popular proxy to measure IU. Firm size is the market capitalization at the bond rating change date.[12] Firm age is calculated as the number of months since the first return appears in CRSP. Firms with a long history tend to have more information available to the market (Barry and Brown 1985; Jiang, Lee and Zhang 2005; Zhang 2006). Dispersion in analyst earnings forecasts is widely used to proxy for the uncertainty about future earnings or the degree of consensus among analysts or market participants (Diether, Malloy, and Scherbina 2002; Imhoff and Lobo 1992). We calculate forecast dispersion as the standard deviation of analyst forecasts.

IU and market reaction around event periods. We sort sample stocks into three equally weighted portfolios (high, medium, and low) using four IU proxies. Table 5 presents the CARs for credit watch placement (–1CW, +1CW) and bond rating change (–1RC, +1RC) for high and low IU portfolios. Our empirical tests generate several new findings. First, IU is an important determinant of market reaction around credit rating actions. High IU firms consistently have significant larger market impacts than low IU firms. For instance, when using sizeas the proxy for IU, the event-period CARs of –6.07%, –2.72%, and –6.22% for credit watch placement, rating change of linked downgrades, and rating change of surprise downgrades, respectively, in high IU firms are significantly greater than –1.69%, –0.66%, and –1.09%, respectively, in low IU firms. Second, credit watch placement appears to reduce firm's IU at bond downgrades. For all four IU proxies, the market reaction around bond downgrades in high IU firms largely diminishes for bond downgrades associated with prior credit watch placement. The mean CARs differences between surprise and linked downgrades range from -2.57% (AGE) to -3.93% (IVOL).

IU and investors' underreaction. Panel A of Table 6 presents post-trading downgrade abnormal returns (CARs, BHARs, and RATS with Carhart's (1997) four-factor model) for high and low IU portfolios. As expected, we observe higher post-event returns following both linked and surprise downgrades in the high IU portfolio than in the low IU portfolio for all four IU proxies. This result suggests that investor underreaction is more severe in firms with high IU.

We now turn our investigation to the main analysis. That is, if credit watch placement conveys information to the financial markets and thus reduces IU, the price drift following linked downgrades in high IU firms should be lower relative to the price drift of surprise downgrades. Consistent with our expectation, we find that the reduction in post-event CARs and BHARs controlling for size and book-to-market are economically sizable and statistically significant. For example, the difference in 12-month CARs between linked and surprised downgrades ranges from –12.92% (IVOL) to –15.88% (SIZE). Overall, our findings indicate that placement on the credit watchlist helps reduce investor underreaction following the bond downgrade. Panel B of Table 6 presents the underreaction coefficients for high IU firms. This evidence further confirms the benefit of the credit watch in reducing investor underreaction. Specifically, the underreaction coefficients of surprise downgrades (24.4%, 17.7%, 18.6%, and 18.6% for IVOL, SIZE, AGE, and DISP, respectively) are much lower than the coefficients of the linked downgrades (49.5%, 40.4%, 41.0%, and 58.0% for IVOL, SIZE, AGE, and DISP, respectively).

CROSS-SECTIONAL MULTIVARIATE REGRESSIONS

Effect of Credit Watch Placement on Event Returns and Investor Underreaction

To investigate the cross-sectional variation in the effect of credit watch placements on abnormal returns around bond downgrade and post-downgrade performance, we employ multivariate regressions and estimate regressions in the following form:

$$AR_i = \alpha_0 + \alpha_1 WATCH_i + \alpha_2 RCHANGE_i + \alpha_3 REGFD_i + \alpha_4 CROSS_i + \varepsilon_i \quad ...(5)$$

The dependent variables are CARs around rating downgrade period (–1RC, +1RC), 12-month post-downgrade CARs, and BHARs. AR is abnormal returns depending on the method used (CARs or BHARs). WATCH is a credit watch dummy variable that equals 1 if the rating change is preceded by credit watch placement, and zero otherwise; RCHANGE is the absolute magnitude of the rating change, where categorical bond ratings are converted into a cardinal variable measured on a 23-point scale (1 = AAA, 23 = D); REGFD is a regulation fair disclosure dummy variable that equals 1 if an observation is from the pre-fair disclosure period, and zero otherwise; CROSS is a dummy variable that equals 1 if a bond is revised from investment grade to speculative grade or vice versa, and zero otherwise.

Table 5
Cumulative Abnormal Returns by Information Uncertainty Proxies

		Linked Downgrade						*Difference*	
	CW			*RC*		*Surprise Downgrade*		*RC*	
Ivol	H	–6.16%	***	–3.40%	***	–7.33%	***	–3.93%	**
		(–6.27)		(–3.06)		(–6.01)		(–2.39)	
	L	–0.19%		–0.13%		–0.29%		–0.16%	
		(–0.39)		(–0.89)		(–1.58)		(–0.71)	
	H–L	–5.97%	***	–3.27%	***	–7.04%	***		
		(–5.44)		(–2.92)		(–5.70)			
Size	H	–6.07%	***	–2.72%	**	–6.22%	***	–3.50%	**
		(–5.38)		(–2.29)		(–5.80)		(–2.19)	
	L	–1.69%	***	–0.66%	*	–1.09%	***	–0.43%	
		(–3.29)		(–1.67)		(–3.06)		(–0.82)	
	H–L	–4.38%	***	–2.06%	*	–5.13%	***		
		(–3.53)		(–1.65)		(–4.54)			
Age	H	–4.19%	***	–2.86%	***	–5.43%	***	–2.57%	**
		(–3.91)		(–3.12)		(–5.91)		(–1.97)	
	L	–2.68%	***	–0.93%		–0.87%		0.06%	
		(–3.66)		(–1.08)		(–1.50)		(–0.05)	
	H–L	–1.51%		–1.93%		–4.56%	***		
		(–1.17)		(–1.54)		(–4.19)			
Disp	H	–5.74%	***	–0.73%		–4.49%	***	–3.76%	***
		(–5.21)		(–0.77)		(–4.20)		(–2.62)	
	L	–1.65%	**	–0.76%		–1.04%	**	–0.28%	
		(–2.39)		(–1.41)		(–2.40)		(–0.40)	
	H–L	–4.09%	***	0.03%		–3.45%	***		
		(–3.13)		(0.02)		(–2.99)			

This table reports cumulative abnormal returns (CARs) sorted into three equally weighted portfolios (High, Medium, and Low) by four information uncertainty (IU) proxies for linked sample of credit watch placements and bond rating changes for event window of credit watch placement (–1 to 1, where day 0 denotes the day of the credit watch placements), and event window of bond rating changes (–1 to 1, where day 0 denotes the day of the bond rating changes). CAR is defined as stock return minus the contemporaneous return on the value–weighted market portfolio. Idiosyncratic volatility (IVOL) is calculated as the average monthly idiosyncratic risk during the prior quarter before portfolio formation. Firm size (SIZE) is the market capitalization at the bond rating change date. Firm age (AGE) is the number of years since the firm was first covered by CRSP. Analyst dispersion (DISP) is the standard deviation of analyst forecasts in month of bond rating change. CW is credit watch placement. RC is bond rating change. The sample period is from October 1992 to December 2005. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively. t–statistics are reported in the parentheses.

Table 6
Post-Event Abnormal Returns by Information Uncertainty Proxy

Panel A: Post–Downgrade 12 Month Cumulative Abnormal Returns Sorted by Information Uncertainty

			Ivol			*Size*			*Age*			*Disp*		
			AR	*t*		*AR*	*t*		*AR*	*t*		*AR*	*t*	
Linked Downgrade	CAR	High	–9.77%	(–1.78)	*	–12.97%	(–2.59)	***	–10.16%	(–2.29)	**	–4.69%	(–1.18)	
		Low	1.24%	(0.74)		3.49%	(1.48)		4.68%	(1.59)		1.16%	(0.38)	
		H–L	–11.01%	(–1.92)	*	–16.46%	(–2.97)	***	–14.84%	(–2.79)	***	–5.85%	(–1.17)	
	BHAR	High	–8.33%	(–1.58)		–12.35%	(–2.57)	***	–11.91%	(–2.78)	***	–7.56%	(–2.04)	**
		Low	0.37%	(0.19)		2.56%	(1.04)		4.51%	(1.46)		0.64%	(0.20)	
		H–L	–8.70%	(–1.55)		–14.91%	(–2.76)	***	–16.42%	(–3.11)	***	–8.20%	(–1.68)	*
Surprise Downgrade	CAR	High	–22.69%	(–3.48)	***	–28.85%	(–5.01)	***	–23.79%	(–4.16)	***	–19.68%	(–3.23)	***
		Low	1.45%	(0.72)		0.74%	(0.33)		0.30%	(0.08)		–2.06%	(–0.67)	
		H–L	–24.14%	(–3.53)	***	–29.59%	(–4.80)	***	–24.09%	(–3.52)	***	–17.62%	(–2.58)	***
	BHAR	High	–23.13%	(–4.03)	***	–31.37%	(–6.34)	***	–21.83%	(–4.62)	***	–19.34%	(–3.77)	***
		Low	0.09%	(0.04)		0.56%	(0.29)		–1.42%	(–0.39)		–2.65%	(–0.83)	
		H–L	–23.22%	(–3.80)	***	–31.93%	(–6.04)	***	–20.41%	(–3.41)	***	–16.69%	(–2.76)	***
Difference	CAR	High	–12.92%	(–1.52)		–15.88%	(–2.08)	**	–13.63%	(–1.88)	*	–14.99%	(–2.13)	**
Surprise – Linked		Low	0.21%	(0.08)		–2.75%	(–0.85)		–4.38%	(–0.91)		–3.22%	(–0.74)	
	BHAR	High	–14.80%	(–1.90)	*	–19.02%	(–2.76)	***	–9.92%	(–1.56)		–11.78%	(–1.91)	**
		Low	–0.28%	(–0.10)		–2.00%	(–0.63)		–5.93%	(–1.23)		–3.29%	(–0.72)	

Panel B: Underreaction Coefficients for High IU

	Ivol (%)	*Size (%)*	*Age (%)*	*Disp (%)*
Linked Downgrade	49.5	40.4	41.0	58.0
Surprise Downgrade	24.4	17.7	18.6	18.6

Contd. table 6

Panel A reports one–year cumulative abnormal returns (CARs), buy–and–hold abnormal returns (BHARs), and Ibbotson's (1975) returns across time and securities (RATS) using Fama and French (1993) three-factor plus Carhart's (1997) momentum factor following bond rating changes by each information uncertainty proxy (IU). CAR is defined as monthly stock return minus the corresponding monthly return for the matching size and book–to–market portfolio. BHAR is defined as the buy–and–hold raw return for the appropriate horizon minus the buy–and hold return for a benchmark portfolio matched on size and book–to–market. Panel B reports underreaction coefficients (URC) for high IU firms. URC is event date reaction divided by the total reaction (event date reaction plus post–event return). Stocks are sorted by four different IU proxies to form three equal portfolios. Idiosyncratic volatility (IVOL) is calculated as the average monthly idiosyncratic risk during the prior quarter before portfolio formation. Firm size (SIZE) is the market capitalization at the bond rating change date. Firm age (AGE) is the number of years since the firm was first covered by CRSP. Analyst dispersion (DISP) is the standard deviation of analyst forecasts in month of bond rating change. AR is abnormal returns depending on which method used: CAR, BHAR or RATS. The sample period is from October 1992 to December 2005. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

CARs around rating downgrade period. The variable of interest is the coefficient of WATCH, which gauges the informational impact of credit watch placement on the intercept. If credit watch placement provides information to investors and reduces the impact of the actual rating downgrade, we expect the coefficient of WATCH to be positive. Existing research shows that RCHANGE is a key determinant of the stock price impact around rating changes. Greater RCHANGE should result in more negative informational impact so we expect the coefficient on RCHANGE to be negative. Jorion, Liu and Shi (2005) examine REGFD and find that the rating becomes more informative after the implementation of the Regulation FD. Hence, we expect the coefficients on REGFD to be positive. Finally, the variable CROSS controls for the possibility that across-class rating revisions that shift a bond into or out of investment grade are associated with larger market reactions. We therefore expect a negative sign on CROSS for rating downgrades.

Regression is the Informational effect on the return around the rating change of bond rating revisions. Panel A of Table 7 reports the estimated coefficients of the multivariate regression. VIF value for both upgrade and downgrade regression is not over 1.08 so there is no problem of multi-collinearity. However, for the test of heteroscedasticity, the test rejects the null hypothesis which means that the data is heteroscedastic. Even though the violation of heteroscedasticity assumption will still provide unbiased estimate for the relationship between the predictor variable and the outcome, but the standard errors and inference are suspect. We correct this by adjusting standard error estimates to be robust standard error. The coefficient on WATCH is 2.26 and significant at 1% level, suggesting that credit watch placement reduces the stock price reaction at the rating downgrade. The coefficient on RCHANGE and REGFD implies that the marginal effect of a downgrade in rating of one grade on abnormal stock returns is –1.54 and –1.01 respectively. The sign of the coefficients on CROSS is negative, but not significant.

CARs and BHARs post-event abnormal returns. We estimate the multivariate regression for 12-month post-event abnormal returns following ratings downgrade. We expect the value of the coefficient of WATCH

Table 7
Regression of Credit Watch Placement with Robust Standard Errors

		Downgrade			
	Expect Sign	*Coefficients*	*t–stat*		*VIF*
Panel A: Market Reaction around Rating Revision					
Intercept		–0.63	–0.54		
Watch	+	2.26	3.6	***	1.05
REGFD	–	–1.01	–1.65	*	1.02
Rchange	–	–1.54	–1.98	**	1.02
Cross	–	–0.17	–0.17 1.05		
Adjusted R^2 (%)		1.76			
F-stat		7.53***			
Heteroscedasticity		37.26***			
No. of obs.		1460			

Contd. table 7

		Downgrade			
	Expect Sign	*Coefficients*	*t–stat*		*VIF*
Panel B: Post–Event CAR					
Intercept		–9.94	–2.42	**	
Watch	+	8.98	2.55	***	1.05
REGFD	+	7.49	2.14	**	1.02
Rchange	–	–3.24	–1.32		1.02
Cross	–	–2.24	–0.49		1.05
Adjusted R^2 (%)		0.65			
F-stat		3.37***			
Heteroscedasticity		80.61***			
No. of obs.		1460			
Panel C: Post–Event BHAR					
Intercept		–12.3	–3.27	***	
Watch	+	7.18	2.15	**	1.05
REGFD	+	9.48	2.87	***	1.02
Rchange	–	–1.17	–0.53		1.02
Cross	–	–6.4	–1.45		1.05
Adjusted R^2 (%)		0.71			
F-stat		3.61***			
Heteroscedasticity		61.99***			
No. of obs.		1457			

This tables report the regression analysis for the effects of credit watch placement on stock price reaction. Panel A reports cumulative abnormal returns (CARs) for the rating change event period. Panel B reports one–year CARs. Panel C reports one–year BHARs.

$$AR_i = \alpha_0 + \alpha_1 \text{Watch}_i + \alpha_2 \text{Rchange}_i + \alpha_3 \text{REGFD}_i + \alpha_4 \text{Cross}_i + \alpha_i + \varepsilon_i$$

AR is abnormal return depending on method used: CAR or BHAR. WATCH is credit watch dummy variable that equals 1 if rating change is preceded by credit watch placement and zero otherwise; RCHANGE is the absolute magnitude of the rating change, where categorical bond ratings are converted into a cardinal variable measured on a 23-point scale (1 = *AAA*, 23 = *D*); REGFD is the fair disclosure regulation dummy variable equal to one if an observation is from the post–fair disclosure period and zero otherwise; CROSS is a dummy variable set that equals 1 if a bond is revised from investment grade to speculative grade or vice versa, and zero otherwise. The sample period is from October 1992 to December 2005.

to be positive if credit watch placement helps reduce IU, which, in turn, reduces post downgrade returns. We expect the coefficients of RCHANGE and CROSS to be negative.[13] Panels B and C of Table 7 present the estimated coefficients from multivariate regressions for CARs and BHARs, respectively. The coefficients of WATCH are positive and statistically significant, suggesting that the average post-event CARs and BHARs are significantly larger for surprise downgrades than linked downgrades. The result suggests that credit watch placement helps reduce investor underreaction to rating downgrades. The coefficient of

RCHANGE and CROSS are negative but not statistically significant. However, we observe large and significant coefficient of REGFD. The coefficients for post-event CARs and BHARs are 7.49 and 9.48, respectively, and both are statistically significant. These results are in line with our conjecture that Regulation FD helps mitigate ambiguity and volatility of the firms, which, in turn, reduce investor underreaction in the long run.

Information Uncertainty, Market Reaction and Investor Underreaction

To investigate the cross-sectional variation in the effect of credit watch placements together with IU on abnormal returns around bond downgrade and post-downgrade performance, we employ multivariate regressions and estimate regressions in the following forms.

$$AR_i = \alpha_0 + \alpha_1 \text{WATCH}_i \times \text{HIGH}_i + \alpha_2 \text{WATCH}_i \times \text{LOW}_i + \alpha_3 \text{RCHANGE}_i + \alpha_4 \text{REGFD}_i + \alpha_5 \text{CROSS}_i + \alpha_6 \text{HIGH} + \alpha_7 \text{LOW} + \varepsilon_i$$

The dependent variable is CARs around rating downgrade period (– 1*RC*, + 1*RC*), 12-month post-downgrade CARs, and BHARs. We include the interaction terms of credit watch dummy with other four dummy variables according to IU group. WATCH × HIGH is a dummy variable that equals 1 if negative credit watch placement occurs in the high IU group, and zero otherwise. HIGH is the high IU dummy variable that equals 1 if the firms are in the high IU group, and zero otherwise. We report four models by changing the information proxy for each model. The other control variables are the same as in regression (1).

Table 8 presents the estimated coefficients from the multivariate regressions. The positive coefficients of WATCH × HIGH confirm the importance of credit watch placement in a high IU environment. The coefficients of WATCH × HIGH are statistically significant for the rating change CARs, 12-month CARs, and BHARs (Panels *A*, *B*, and *C*, respectively). For example, in Panel *A* the coefficient on WATCH × HIGH (IVOL) is 4.20, which is significant at 1% level. The result shows that the act of putting firms on credit watch placement does not have any informational impact on the event period or price drift when IU is low. The results from other variables are similar to those of Table 6. For market reaction around downgrade event, the coefficients of RCHANGE are large and statistically significant across all four proxies whereas the coefficients of REGFD and CROSS are small and insignificant. However, for post-downgrade returns, the coefficients of REGFD are large and significant across all four proxies, and the coefficients of RCHANGE and CROSS are small and insignificant. The results confirm that the magnitude of the rating change is an important determinant for event period returns and that the Regulation FD is important determinant for post-event returns.

ROBUSTNESS CHECKS

Post-Downgrade Operating Performance

One potential criticism leveled at the results is that the price drift following rating downgrade is caused by deterioration in operating performance rather than investor underreaction. To determine the validity of this concern, we examine the change in post-downgrade operating performance for the whole sample as well as high IU firms. We measure the post-downgrade operating performance as the performance-adjusted

Table 8
Regression of Credit Watch Placement with Information Uncertainty for Downgrade using Robust Standard Errors

	Coefficients	*t-stat*		*Coefficients*	*t-stat*		*Coefficients*	*t-stat*		*Coefficients*	*t-stat*	
Panel A: Market Reaction at Event Period												
Intercept	0.83	(0.82)		0.69	(0.67)		0.96	(0.95)		0.42	(0.39)	
Watch × High	4.2	(2.59)	***	3.73	(2.33)	**	2.82	(2.19)	**	4.27	(3.04)	***
Rchange	–0.88	(–1.45)		–1.11	(–1.84)	*	–0.85	(–1.37)		–0.9	(–1.46)	
REGFD	–0.92	(–1.14)		–1.01	(–1.30)		–1.36	(–1.71)	*	–1.56	(–2.02)	**
Cross	–0.21	(–0.22)		–0.26	(–0.26)		0.02	(0.02)		0.29	(0.30)	
Ivol high	–6.14	(–4.67)	***									
Size high				–4.63	(–4.01)	***						
Age high							–3.92	(–3.91)	***			
Disp high										–2.29	(–2.07)	**
Adj. R^2 (%)	4.05			2.66			2.23			1.71		
F-stat	13.32***			8.97***			7.65***			6.08***		
Heteroscedasticity	91.67***			70.59***			49.29***			45.76***		
No. of obs.	1460			1460			1460			1460		
Panel B: Post-Downgrade CAR												
Intercept	–4.55	(–1.26)		–3.38	(–0.93)		–2.29	(–0.60)		–4.51	(–1.18)	
Watch × High	12.58	(1.48)		15.85	(2.06)	**	13.66	(1.88)	*	15.47	(2.34)	**
Rchange	8.07	(2.33)	**	6.47	(1.87)	*	8.21	(2.38)	**	7.91	(2.28)	**
REGFD	–1.08	(–0.44)		0.53	(0.22)		–2.29	(–0.94)		–3.06	(–1.53)	
Cross	–1.81	(–0.41)		–3.91	(–0.86)		–2.23	(–0.49)		0.23	(0.04)	
Ivol high	–20.01	(–2.95)	***									
Size high				–29.09	(–4.71)	***						
Age high							–21.85	(–3.63)	***			
Disp high										–14.41	(–2.73)	***
Adj. R^2 (%)	1.31			2.67			1.61			0.68		
F-stat	4.88***			9.00***			5.78***			2.99**		
Heteroscedasticity	118.11***			87.29***			87.92***			80.99***		
No. of obs.	1460			1460			1460			1460		
Panel: C Post-Downgrade BHAR												
Intercept	–7.45	(–2.14)	**	–5.89	(–1.71)	*	–5.22	(–1.46) –7.13		(–2.00)	**	
Watch × High	14.32	(2.52)	***	19.31	(3.46)	***	9.95	(1.76) 11.82		(1.91)	*	
Rchange	9.92	(3.06)	***	7.96	(2.48)	**	10.11	(3.12)	*	9.81	(3.01)	***
REGFD	1.1	(0.57) 3.08		(1.59) –0.21		(–0.11)		***	–0.85		(–0.45)	

Contd. table 8

	Coefficients	*t-stat*		*Coefficients*	*t-stat*		*Coefficients*	*t-stat*		*Coefficients*	*t-stat*	
Cross	–6.85	(–1.19)		–9.46	(–1.66)	*	–6.61	(–1.15)		–4.06	(–0.70)	
Ivol high	–22.03	(–4.83)	***									
Size high				–34.22	(–7.54)	***						
Age high							–20.91	(–4.67)	***			
Disp high										–15.16	(–3.06)	***
Adj. R^2 (%)	1.93			4.24			1.97			0.97		
F-stat	6.72***			13.90***			6.84***			3.85***		
Heteroscedasticity	77.39***			59.16***			58.02***			63.02***		
No. of obs.	1457			1457			1457			1457		

This tables report the regression analysis for the effects of credit watch placement and information uncertainty (IU) on stock price reaction. Panel A reports cumulative abnormal returns (CARs) on the rating change event period. Panel B reports one–year CARs. Panel C reports one–year buy–and–hold returns (BHARs).

$$AR_i = \alpha_0 + \alpha_1 \text{Watch}_i \times \text{High}_i + \alpha_3 \text{Rchange}_i + \alpha_4 \text{REGFD}_i + \alpha_5 \text{Cross}_i + \alpha_6 \text{ High} + \varepsilon_i$$

AR is abnormal return depending on method used: CAR or BHAR. WATCH is credit watch dummy variable that equals 1 if a rating change is preceded by credit watch placement, and zero otherwise; RCHANGE is the absolute magnitude of the rating change, where categorical bond ratings are converted into a cardinal variable measured on a 23–point scale (1 = *AAA*, 23 = *D*); REGFD is a fair disclosure regulation dummy variable that equals 1 if an observation is from the post–fair disclosure period, and zero otherwise; CROSS is a dummy variable that equals 1 if a bond is revised from investment grade to speculative grade or vice versa, and zero otherwise. HIGH is an IU proxy dummy variable that equals to 1 if an observation is from the high IU grouping, and zero otherwise. Four IU proxies are used; IVOL, SIZE, AGE, and DISP. Idiosyncratic volatility (IVOL) is calculated as the average monthly idiosyncratic risk during the prior quarter before portfolio formation. Firm size (SIZE) is the market capitalization at the bond rating change date. Firm age (AGE) is the number of years since the firm was first covered by CRSP. Analyst dispersion (DISP) is the standard deviation of analyst forecasts in month of bond rating change. The sample period is from October 1992 to December 2005.

return-on-assets (ROA) over four quarters after the rating downgrade quarter.We define ROA as operating income divided by cash-adjusted total assets (total assets minus cash and cash equivalent) at the beginning of the quarter. The performance-adjusted ROA for a given firm is the firm-specific ROA minus the ROA of a matched firm with similar pre-event performance.

For each sample firm, we select all firms in the same two-digit SIC code that have an operating performance for the announcement quarter (quarter 0) within 20% or within 0.01, operating performance for the four quarters ending with quarter 0 within 20% or within 0.01, and pre-announcement market-to-book value of assets within 20% or within 0.1. From all the potential matches, we select the firm that has the lowest sum of absolute performance difference, defined as

$$\left|\text{Perfomance}_{\text{quarter 0, sample firm}} - \text{Performance}_{\text{quarter 0, firm } i}\right| + \left|\text{Performance}_{\text{Four quarters ending with quarter 0, sample firm}} - \text{Performance}_{\text{Fourquarters ending with quarter 0, firm } i}\right| \quad \text{...(7)}$$

Following Lie (2005), if the sample firm lacks necessary data to calculate operating performance for any of the four quarters ending with quarter 0, we disregard the second term in the equation. Table 9 reports operating performance improvement following the rating downgrade of the sample firms. The operating performance improvement equals the average performance-adjusted ROA four quarters after rating changes minus the average performance adjusted ROA from quarter –3 to quarter 0. Panel A and Panel B present the operating performance improvement for the whole sample and high IU firms, respectively. Regarding the statistical test, we use a nonparametric test by comparing median operating performance and report the *p*-value of the *z*-statistic. For the whole sample, the results show that the operating performance of the firms slightly improves for both linked and surprise downgrade and upgrade. For the high IU sample, most of the operating performance is very close to zero. More importantly, none of the differences between linked and surprise downgrades show statistically significant value. This result supports our findings of investors' underreaction rather than deterioration of companies' performance.

TABLE 9

Rating Upgrade Events

Prior research documents that credit rating upgrade is not informative and there is no significant identifiable impact around rating upgrades and post-upgrade return up to one year following rating upgrades (Hand *et al.* 1992; Holthausen and Leftwich 1986; Dichev and Piotroski 2001). Nevertheless, we perform the robustness check on the upgrades to make sure that we do not miss anything important in our analysis. Our findings indicates that while positive credit watch is informative but the actual rating upgrades for both surprise and linked upgrade have insignificantly market impact. Second, the one-year post-upgrade cumulative abnormal return is not statistically significant and is merely 1.84%, consistent with Dichev and Piotroski (2001)'s findings in that there is no significant post-upgrade returns. When we partition our upgrades into linked and surprise upgrades, the linked upgrade has the post-upgrade return of approximately 4%, while the surprise upgrade has the post-upgrade return of less than 1% but their difference is not statistically significant. Lastly, after we partition our sample into high and low IU, none of the post-upgrade return shows significant price drift and there is no difference in returns between high and low IU samples. Overall, we confirm that the credit rating upgrades are not as important as credit rating downgrades, thus, we do not miss out anything important in the rating upgrades that will cause our downgrades analysis to be incomplete.

CONCLUSIONS AND DISCUSSION

We examine the importance of credit watch placement in the process of bond rating downgrade. We use an extensive database of credit watch placements and the subsequent bond rating changes over a thirteen-year period. Our empirical examination builds on three distinct levels. The first level relates to conclusions emerging directly from the characteristics and market reaction associated with bond's placement on credit watch. We find that the act of placing a publicly traded corporation's bond on a watchlist appears to be the most informative event in bond rating process— even more so than the event of bond rating change itself. Our findings also suggest that credit watch placement provides an essential benefit by reducing the company's stock price volatility at actual bond rating changes. In the second level of our analysis, we examine how credit watch placement affects investor underreaction following bond downgrades. Our findings provide unambiguous supportfor the usefulness of credit watch placement in attenuating investor underreaction following the bond downgrades. The results show that the inclusion of credit watch placement significantly reduces price drift following rating downgrades. In the third level of our analysis, we examine when and

Table 9
Post-Rating Downgrade Performance

	Improvement
Panel A: Improvement in Operating Performance for Whole Sample	
Surprise Rating Downgrade	0.00015 (0.578)
Linked Rating Downgrade	0.00033 (0.274)
Difference	–0.00018 (0.436)
Panel B: Improvement in Operating Performance for High IU	
Ivol	
Surprise Rating Downgrade	0.001 (0.5825)
Linked Rating Downgrade	0.0014 (0.4017)
Difference	–0.0004 (0.6482)
Size	
Surprise Rating Downgrade	0.0003 (0.2904)
Linked Rating Downgrade	0.0002 (1.000)
Difference	0.0001 (0.6618)
Age	
Surprise Rating Downgrade	0.0004 (0.2384)
Linked Rating Downgrade	0.0012 (0.076*)
Difference	–0.0008 (0.2201)
Disp	
Surprise Rating Downgrade	0.0009 (0.4913)
Linked Rating Downgrade	–0.001 (0.3777)
Difference	0.0019 (0.2341)

This table reports post-rating downgrade operating performance. Panel A (Panel B) reports improvement in operating performance for the whole sample (high IU firms). Improvement in operating performance is measured as performance-matched quarterly return on assets averaged over one year minus performance matched return on assets for quarter 0 where quarter 0 is the rating downgrade announcement quarter. p-values are reported in parentheses.

why credit watch placement has the most significant impact on stock prices during bond downgrade and post-event periods. We show that the market reactions to rating events and post-downgrade events are consistently higher in high IU than in low IU firms. We also find that credit watch placement plays an important role in attenuating abnormal returns around actual bond downgrade and post-downgrade abnormal returns in the high IU firms. In sum, we conclude that being included on the credit watchlist is a significant information event and one that should be focused on by researchers, practitioners and policy makers, rather than the event of the actual bond rating change itself.

The limitation to this paper is the availability of the information. We only study the bond rating revision up to December 2005 due to the lack of data. However, it is not appropriate to use the rating change data from 2008 onwards. This is because there is the subprime crisis in 2008. The creditability of the rating agency deteriorates tremendously following hamburger crisis which AAA rating had gone default. Moreover, Gartner and Griesbach (2012) discuss the problems of self-fulfilling prophecy on European sovereign debt crisis from 2009-2011. It would be interesting to separate the research to study on investor's reaction during the financial crisis from 2008-2012.

Potential venues for future research may include the credit rating revision from S&P. This paper only uses the rating revision from Moody's. The research on S&P rating revision may or may not yield the same result as Moody's. Furthermore, there may be concurrent rating revision announcement from both Moody's and S&P. Sometimes S&P announces first. The other time Moody's announces first. This situation can potentially affect the market impact and may alter the conclusion. The consolidation of both S&P and Moody's rating revision can help the credit rating to be even more accurate in the future.

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Compliance with Ethical Guidelines

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Authors' Contributions

NT, the corresponding author, has contributed half of the manuscript. CC and EM both have contributed equally for the remaining parts. All authors read and approved the final manuscript.

NOTES

1. Holthausen and Leftwich (1986), note: "Reliable inferences about resolutions contrary to the indicated direction are hampered by small sample sizes. Larger sample sizes available with the passage of time will provide more insight into the announcement effect of those resolutions" (P.85).
2. A firm's IU is defined as value ambiguity: that is, the degree to which a firm's value can be reasonably estimated by even the most knowledgeable investors at reasonable costs (Jiang, Lee, and Zhang 2005; Zhang 2006). High IU firms are firms whose information is difficult to acquire by investors, and thus estimates of their fundamental value are inherently less reliable and more volatile.

3. To do so, we look for news stories in the *Wall Street Journal* for possible contaminated events in the window spanning the three trading days before and after a credit watch placement and a bond rating change announcement. For each news item found, we read the story to determine whether it contains a price-moving news announcement. If a story contains information other than the rating agency announcement, we exclude the credit watch placement from our analysis.
4. Credit watches with uncertainty implications are very rare, and we delete less than 1% of the sample.
5. Both CARs and BHARs have their own strengths and can be considered as complementary approaches to computing abnormal returns. Fama (1998) recommends CARs because they have better statistical properties and generally allow for cleaner tests of mispricing. Barber and Lyon (1997) favor BHARs because they reflect the compounding in post-event returns.
7. Size is measured as closing prices from the previous month times the most recent number of shares outstanding. The size quintile breakpoints are based on NYSE firms only.
8. Book values equal the last reported book value for a period ending at least six months prior to the ratings change.
9. Monthly abnormal returns are monthly abnormal return by the firm specific returns minus the corresponding monthly returns for the matching size and book-to-market portfolio. We then add monthly firm-specific abnormal returns to form 12-month firm-specific CARs. BHARs are measured as the BHAR for the appropriate horizon minus the BHAR for a benchmark portfolio matched on size and book-to-market.
10. ER covers the rating change period [–1*RC*, +1*RC*] for surprise downgrades and covers both the credit watch period [–1CW, +1CW] and rating change period [–1*RC*, +1*RC*] for linked downgrades. *SR* covers the subsequent return from t+1 to t+12, where t is the rating downgrade month.
11. Jiang, Xu, and Yao (2009), provide evidence that IVOL contains information about the future earnings of the firm. High IVOL firms are those firms with poor prospects of future earnings.
12. We use firm size as a proxy because small firms are less diversified and have less information available for the market than large firms. Small firms may also have fewer customers, suppliers, and shareholders and may not bear high disclosure preparation costs (Zhang 2006).
13. When the magnitude of rating change is larger or the bonds shift from or into speculative grade, market impacts should be larger and, hence, result in larger price drift. We expect the coefficients of REGFD to be negative because the Regulation FD allows credit rating agencies access to confidential information that is no longer available to equity analysts, resulting in potentially increases in the information content of the credit rating agency announcements.

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