THE RATING GAME: AN EMPIRICAL ASSESSMENT

by

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Abstract

The question of whether ratings agencies convey new information to financial markets when they assign new ratings or change previous ratings has been debated for at least 40 years. In this study I first examine equity market, bond market and CDS market reactions to long and short term rating changes from S&P, Fitch and Moody's. I find that not all the credit rating changes affect the market but only those classified as unanticipated. Subsequently, I study whether the regulatory setting, in which the Credit Ratings Agencies work, can possibly affect the financial markets reactions. Lastly I show that the probability of a future rating change is severely affected by different factors proportional hazard rate models.

1 Introduction

The 2008 - 2009 financial crisis called regulatory attention to the credit rating agencies. In the US, for example, the Financial Crisis Inquiry Commission concluded that "this crisis could not have happened without the rating agencies.[1]" Overseas, in Italy, Corte dei Conti[2] stated that "credit ratings assigned to sovereign debt, when not adequately formed, can be source of discredit, can feed confusion and can negatively influence the protagonists of public finance at every level.[3]" Credit rating agencies have been at the center of government enquiries, and in some countries they have been charged for manipulating the market.[4] It is implicit in these enquiries and charges that regulators believe that credit rating agencies provide new information about the creditworthiness of their customers to the market.

The question of whether ratings agencies convey new information to the markets in assigning new ratings or changing previous ratings has been debated for at least 40 years. Kaplan and Urwitz (1979), Fabozzi and Pollack (1987) and Wakeman (1990) suggest that rating agencies simply summarize existing public information. Under this view, the rating agencies lower investors' information costs but they do not provide new data. On the other hand, rating agencies claim to have access to private information that allows them to better evaluate an issuer's financial situation. Under this second view, ratings are forward-looking, and they convey information to bondholders without divulging possible harmful details to competitors. Papers that support this alternative

[1] 2011, p. XXV..

[2] Corte dei Conti is a supreme audit institution preforming financial and/or legal audit on the executive branch of power.

[3] June 2012 – Corte dei Conti.

[4] June 2012 – In April 2012 the SEC initiated a "cease and desist" administrative proceeding it deemed "necessary for the protection of investors and in the public interest" against Egan-Jones Ratings Co., a privately owned, 20-person firm based in Haverford, Pennsylvania, and against its principal owner, Sean Egan. In Italy, on November the 12th 2012, prosecutors filed suit against five former employees of Standard and Poor's (S&P) and two former employees of Fitch for allegedly manipulating the market and abusing privileged information that led to the rating agencies' downgrades of Italy. Though magistrates in Rome and Milan have refused to support the claim, prosecutors from the southern town of Trani contend that the agencies failed to respect European rules of transparency.

view are Hsueh and Kidwell (1988), Ederington, Yawitz and Roberts (1987) and Liu and Thakor (1984). Empirically, researchers have extensively studied the effects of long term-ratings changes on stock and bond prices. The studies that have analyzed the market response to long term ratings changes have found a significant market reaction for downgrades and no significant reaction to upgrades.

In the first part of study I further investigate the information content of ratings changes in the period between January 2000 and December 2012. I use event studies to measure the market reaction of equity prices and bond yields to both long- and short-term credit rating changes from the three leading international credit rating agencies: Moody's, S&P and Fitch. The potential contribution of this part of study is to disentangle rating events by classifying them into two categories: anticipated and unanticipated. This scheme sheds light on the conflicting results in the literature. I analyze each agency separately to explore whether the market reacts in the same manner to all of their rating events. Lastly I examine not only long-term rating events but also the short-term ratings, to have a broader understanding of market reactions to credit rating events.

I find evidence, consistent with prior literature, that there is a significant market reaction after a downgrade event. This reaction is almost entirely driven by those events that I classify as unanticipated. I define cases as unanticipated when credit rating agencies change the rating of an entity without having previously placed the entity on watchlist. Unlike prior literature I find significant market reactions to an upgrade event if the event is unanticipated while when I do not condition on credit watch, I find no significant market reaction, which is consistent with previous studies. I also analyze the market reaction to another type of "unanticipated" event: when a firm is placed on a rating agency's watch list. I find a significant market reaction to these events (both upgrades and downgrades). Furthermore, the market seems to be able to predict if the watch list will be confirmed or not. Finally, there is a significant market reaction when a watch list indication is not confirmed while there is no reaction when it is.

The market reaction to credit rating changes is different based on which one of the rating agencies has generated the event: while there is a strong reaction to S&P and Moody's rating changes I find no evidence that the market react subsequently to Fitch's changes. The reaction is also significantly different based on the grade: I find a stronger reaction when the credit rating goes from investment to non investment grade or from non investment to investment grade than when this change does not happen.

I then process the text news posted by the rating agencies when a credit event happens to detect its rationale. As hypothesized by Goh and Ederington (1993) long-term debt rating downgrades may make stockholders better off, thus generating a positive stock price reaction, if the downgrade does not convey new negative information about earnings or sales but instead reflects increased leverage. Black and Scholes (1972) and DeAngelo and Masulis (1980) note that an increase in leverage (or a mean-preserving increase in cash flow volatility) transfers value from bondholders to stockholders. Consistent with Goh and Ederington's hypothesis, I find that there is a stronger negative reaction when the events that triggered the downgrade were due to fundamental reasons with respect to those events triggered by leverage reasons.

In the second part I analyze whether the observed markets reaction can be fully attributed to information and/or to regulation. In order to try to disentangle the two cases I focus on subsequent agency rating change events (defined as the announcement of a downgrade or upgrade rating event that arrives to the market shortly after another rating agency's similar event) for the subset of firms that are rated by all three agencies. I find that subsequent announcements have a significant incremental effect around the investment grade barrier, while not so significant for other rating changes. This result suggests that the regulatory environment may have some effect on the market reaction to rating changes.

In the last part of my study I use the proportional hazard rate models to study whether the probability of a rating change is affected by different factors. I find that both the direction of the previous change, the current rating and a competitor rating change affect the probability of a rating change. This results suggest that studies that consider a company credit rating as explanatory variable may not be able to fully capture the riskiness of the firm due to the imperfect assumption that credit ratings are Markovian.

Overall my study is consistent with the strand of the existing literature that supports the view that credit rating agencies do have superior information. The remainder of the paper is organized as follows. In Section 2 I review the existing literature. In Section 3 I discuss credit rating events and I provide a description of the data. The methodology is presented in Section 4. I exhibit my results in Section 5 and Section 6 concludes the paper.

2 Motivating facts and literature review

Given the high interest in the causes of the recent financial crisis and the role that the credit rating agencies may have played in it, it is not surprising that there is a growing interest in how rating agencies work and how their actions affect the markets. This paper is mainly related to the strand of research that examines the impact of credit rating changes on the markets. It is helpful to separate the existing literature in three parts. First, the analysis of stock and bond price reactions to credit rating events. Second, the literature centered on commercial paper and third the literature that focuses on the CDS market reaction after a credit rating event.

Kaplan and Urwitz (1979), Fabozzi and Pollack (1987) and Wakeman (1990) do find that rating agencies don't provide new data to the market but rather summarize existing public information lowering information costs. Another set of papers argues that ratings are a forward looking measure conveying information to markets without divulging possible harmful details to competitors. Hsueh and Kidwell (1988), Edering, Yawitz and Roberts (1987) and Liu and Thakor (1984) show that stock markets do react to credit rating changes. Empirically, researchers have extensively studied the effects of long term ratings changes on stocks prices and bonds prices. Holthausen and Leftwich (1986), Dichev and Pietroski (2001), Vassalou and Xing (2003) and Purda (2007) – find significant negative stock price reaction to ratings downgrades and no significant reaction to rating upgrades events. Grier and Katz (1976), Wansley, Glascock and Clauretie (1992), Hite and Warga (1997) and Steiner and Heinke (2001) find similar results for bond markets. Hand, Holthausen and Leftwich (1992) analyze both stock and bond markets and find that stock prices are more sensitive to rating changes.

The stock price reaction to short term debt rating changes is a less explored topic. Nyar and Rozeff (1994) and Elayan, Maris and Young (1996) find evidence of negative stock price reaction to short term debt downgrades while Crabbe and Post (1994), testing

Diamond (1991), find abnormal declines in the usage of Commercial Paper in the weeks following a downgrade in the financial industry.

The CDS market reaction literature is younger than the two previously cited strands. Longstaff, Mithal and Neis (2005) notice that CDS spreads can be seen as a clearer indicator of cross-sectional and time-series credit quality information than bond prices or yields. Hull, Pedrescu and White (2004) considers Moody's rating changes and Norden and Weber (2004) perform a similar test using all the three rating agencies. Both studies find significant reaction of the CDS market to downgrade and negative watch list events. Greatrex (2009) explores the ability of variables suggested by structural models to explain variation in credit default swap (CDS) spread changes. She finds that these variables are able to explain thirty percent of the variation in CDS spread changes. Furthermore, she finds that a rating-based CDS index that accounts for both credit risk and overall market conditions is the single best predictor of CDS spread changes. The other two variables that significantly help explain variation in monthly CDS spread are leverage and volatility.

Bongaerts, Cremers, and Goetzmann (2012) explores the economic role credit rating agencies play in the corporate bond market. They consider three theories about multiple ratings: information production, rating shopping, and regulatory certification. Using differences in rating composition, default prediction, and credit spread changes, their evidence only supports regulatory certification. Kisgen (2009) shows that firms reduce leverage following credit rating downgrades. In the year following a downgrade, downgraded firms issue approximately 1.5%–2.0% less net debt relative to net equity as a percentage of assets compared to other firms. This effect of a downgrade is larger for downgrades from investment grade to non investment grade and if commercial paper access is affected. In particular firms downgraded to speculative grade are about twice as likely to reduce debt as other firms. Rating upgrades do not affect subsequent capital structure activity, suggesting that firms target minimum rating levels.[5]

Compared to the prior studies I have defined the credit rating change events in a way that allows me to take in consideration at least two major characteristics of a credit rating change: the fact that the event may have been anticipated by a positive/negative watch list from the same rating agency and the fact that a rating change event may have been anticipated by rating changes made by one of the other rating agencies. In my study I consider and compare the reaction of both stock and bond markets to both long and short term rating changes. Lastly I investigate the reactions based on the firm credit rating grade to exploit possible differences.

2.1 Rule 2a-7

A channel through which changes in ratings can affect the market is regulation. Rule 2a-7 states that, to hold itself out as a money market fund, an investment company must meet, among others, the following conditions:

- The money market fund shall limit its portfolio investments to those U.S. dollar-denominated securities that the fund's board of directors determines present minimal credit risks (based on credit quality factors in addition to ratings assigned by Nationally Recognized Statistical Rating Organization (NRSRO)) and that are, at the time of acquisition, eligible securities. Eligible securities are defined as: [i] A Rated Security with a remaining maturity of 397 calendar days or less that has received a rating from the *Requisite* NRSROs in one of the two highest short-term rating categories (within which there may be subcategories or gradations indicating relative standing), or [ii] an Unrated Security that is of comparable quality to

[5]Griffin and Tang(2010) analyze CDOs issued from January 1997 to December 2007 and find that a credit rating agency frequently made adjustments beyond its main model. These adjustments are difficult to explain by likely determinants, but exhibit a clear pattern: CDOs with smaller model-implied AAA sizes receive larger adjustments. However, CDOs with larger adjustments experience more severe subsequent downgrading.

a security meeting the requirements for a Rated Security in paragraph (i) of this section, as determined by the money market fund's board of directors; provided, however, that: a security that at the time of issuance had a remaining maturity of more than 397 calendar days but that has a remaining maturity of 397 calendar days or less and that is an Unrated Security is not an Eligible Security if the security has received a long-term rating from any Designated NRSRO that is not within the Designated NRSRO's three highest long-term ratings categories (within which there may be sub-categories or gradations indicating relative standing), unless the security has received a long-term rating from the Requisite NRSROs in one of the three highest rating categories.

- The money market fund shall be diversified with respect to issuers of securities acquired by the fund, i.e., [i] a money market fund (other than a single state fund) shall not have more than 5% of its total assets in the securities of one issuer. [ii] a taxable money fund shall not have more than the greater of 1% of total assets or $1 million invested in second tier securities. [iii] a first tier security is an eligible security that has received a rating from the *Requisite* NRSROs in one of the two highest short-term rating category or is an unrated security of similar credit quality as determined by the fund's board, is a security issued by a registered money market fund, or is a government security. A second tier security is an eligible security that is not a first tier security. [iv] a repo may be deemed as the acquisition of the underlying security.

Requisite NRSROs means:

- Any two Designated NRSROs that have issued a rating with respect to a security or class of debt obligations of an issuer; or
- If only one Designated NRSRO has issued a rating with respect to such security

or class of debt obligations of an issuer at the time the fund acquires the security, that Designated NRSRO.

Thus an entity that has its Commercial Paper program not rated in the first two tiers by two Rating Agencies will not be eligible for Money Market Funds unless only one Designated NRSRO has issued a rating with respect to such security or class of debt obligations.

I this study I investigate whether the eligibility to Money Market Funds affects the reaction to rating changes in the Commercial Paper market.

3 Data

3.1 Credit Rating Events

A credit rating agency is a firm that provides its opinion on the creditworthiness of an entity and the financial obligations (such as, bonds, preferred stock, and commercial paper) issued by an entity. Generally, credit ratings distinguish between investment grade and non-investment grade. For example, a credit rating agency may assign a "triple A" credit rating as its top "investment grade" rating for corporate bonds and a "double B" credit rating or below for "non-investment grade" or "high-yield" corporate bonds. Credit rating agencies registered as such with the SEC are known as Nationally Recognized Statistical Rating Organizations.[6] When a rating agency perceives that the creditworthiness of an entity is changed with respect to the previous evaluation it consequently changes its rating. Rating agencies can also place entity on positive or negative watchlist: that happens when the rating agencies perceive that the entity creditworthiness may change in the future. Once an entity is placed on review (i.e. watchlist) the credit rating agency can resolve the credit rating assessment by either confirming the previous rating grade and thus not confirming the review or changing the rating grade of the entity accordingly to the review.

In this study I will focus on rating change events from the three most popular firms currently registered as NRSROs: Moody's, Fitch and S&P.[7] I study all firms in the S&P 1500. I collect the data referring to credit rating events from Bloomberg and it spans between January 2000 and September 2012. During this period I examine and define a total of 3669 corporate credit ratings events.[8]

Thanks to the similarity to the rating agency scales, the credit ratings are compa-

[6]U.S. Security and Exchange Commission – NRSROs.

[7]There are ten firms currently registered as NRSROs: A.M. Best Company, DBRS Ltd, Egan-Jones Rating Company, Fitch, Japan Credit Rating Agency, Kroll Bond Rating Agency, Moody's Investors Service, Rating and Investment Information, Realpoint LLC and Standard & Poor's Ratings Services.

[8]Appendix A shows the complete sub-definition of credit ratings events.

rable across the different agencies.[9] I assign a number between 1 (higher rating) and 24 (lowest rating) to long term ratings while I have assigned a number between 1 (higher rating) and 6 (lowest rating) to short term ratings. Positive watchlisted entities are assigned with -0.3 while negative watchlisted are assigned with + 0.3. The sum of an entity rating plus any watchlist modification constitutes the numerical rating scale for a company. Table I presents summary statistics on credit ratings events. Panel A shows the summary statistics by Rating Agencies while Panel B shows the summary statistics by term. The sample is composed of 2097 rating changes and 1572 reviews. The number of downgrades is significantly higher than the number of upgrades and while upgrades are mostly unanticipated (70.44%) downgrades are mostly anticipated (61.28%). The fact that downgrades are mostly anticipated can be a direct consequence of the analyzed period. Between 2000 and 2012 we experienced two "big downgrading waves" (October 2001, the Enron scandal; and September 2008, the Lehman Brothers Holdings bankruptcy). Upgrades, on the other hand, are mostly unanticipated and that seems to be driven by the fact that rating agencies are more prone to place entities on negative watchlist (1294) rather than positive watchlist (278). Lastly 86.33% of entities placed on positive watch list experience a subsequent upgrade while 60.90% of entities placed on negative watch list experience a subsequent downgrade. This is another indicator of the asymmetric treatment between upgrades and downgrades. Agencies are more reluctant to place an issuer on a positive watchlist than on a negative watchlist and only do that if the chances of the issuer being upgraded are very high. It does not appear to be significant variation across rating agencies nor across rating types (long term vs short term).

In Table II I present an overview of the announcement timings. For the purpose of this table a rating agency is considered first announcer on a specific credit event if there

[9] Appendix B illustrate how I compared both the long and the short term ratings scale of the rating agencies

were no announcement by other agencies in the preceding 90 days[10] In this table it is shown that credit rating agencies usually downgrade (upgrade) contemporaneously the long term and short term credit rating of issuers. Furthermore I show that S&P seems to act sooner then its counterparts, especially Fitch.

3.2 Stock, Bond and Credit Default Swap Data

This study concentrates on abnormal performance measurement using daily data. The daily stock data is gathered from the Center for Research in Security Prices (CRSP) at the University of Chicago. I rely on the TRACE dataset to examine bond daily data. TRACE reports on individual bond transactions, and can be used to construct bond returns at a daily frequency. TRACE data starts July 1, 2002, and my sample periods ends ends on June 30, 2012. TRACE provides bond identification information (CUSIP or NASD symbol), as well as the date and time of execution, the price and the yield. In addition TRACE displays the volume for the particular transaction. The volume is displayed in par value (i.e. a reported trade for 500 bonds would be displayed as 500,000). Trades reported for mixed lots (i.e., consisting of whole bonds plus a partial, or "baby bond" of less than $1,000 par value,) are rounded down to the nearest whole number. TRACE always rounds down mixed lots. For reported trade, concerning an investment grade bond, with a par value above $5 million (more than 5,000 bonds), the quantity is displayed as "5MM+". For a reported trade, concerning a non-investment grade bond, with a par value above $1 million (more than 1,000 bonds), the quantity is displayed as "1MM+". The price variable displays the "clean" price at which the trade was executed. Commissions reported as part of the trade are included in the reported price. Effective of November 3, 2008 the yield variable displays the Yield to Maturity. Before November 3, 2008 TRACE was validating the yield input requiring it to be lower

[10] The results are qualitatively the same when I repeat the analysis with exclusionary window lengths of 15, 30, and 45 days.

or equal than the Yield to Call (YTC) or Yield to Maturity (YTM)[11,12]. Consistent with Bassembinder, Kahle, Maxwell and Xu (2008) I eliminate cancelled, corrected, and commission trades from the data[13].

Table III reports summary statistics for the bond sample used in this study. There are 3526 bonds on 386 distinct entities. Thus the average number of bonds per firm in the studied period is just above 9. Almost 60% of the sample is investment grade bonds with maturity higher than 10 years (average maturity for the category is around 20 years) and 11% of the sample is non investment grade bonds with maturity shorter than 5 years (average maturity for the category is slightly above 2 years). This data suggest that investment grade entities usually do not issue bonds with maturity less than five years while non-investment grade entities are more prone to issue bonds with shorter maturity.

A credit default swap (CDS) is a financial swap agreement that the seller of the CDS will compensate the buyer in the event of a loan default or other credit event. The buyer of the CDS makes a series of payments (the CDS "fee" or "spread") to the seller and, in exchange, receives a payoff if the loan defaults. In the event of default the buyer of the CDS receives compensation. Anyone can purchase a CDS, even buyers who do not hold the loan instrument and who have no direct insurable interest in the loan (these are called "naked" CDSs). I collect data on 5 years CDS Spreads for 289 different entities from Bloomberg. Bloomberg CDS spreads are available from as early as 2004 for certain companies, but only from 2010 for other companies. In order to better understand the implications of my analysis it has to be noted that a major CDS market structure change – called “Big Bang” - occurred on April 8 2009. The main novelties introduced by the

[11] FINRA – TRACE Trade Reporting and Compliance Engine - User Guide Version 2.2 December 1, 2008

[12] Bessembinder, Maxwell, and Venkataraman (2006) and Edwards, Harris, and Pioware (2007) provide a complete description of TRACE.

[13] I am grateful to Kathy Kahle for allowing me to use the original code from Bessembinder, Kahle, Maxwell, and Yu (2008) to clean the TRACE database.

Big Bang contract can be summarized as follows:

- introduction of Determination Committees;
- introduction of a Central Clearing House;
- introduction of an Auction Settlement Method;
- restrictions on Restructuring conventions;
- creation of a Credit Event Backstop Date;
- introduction of a First Full Coupon clause;
- introduction of a fixed coupon plus Upfront fees.

These changes were designed to make CDS more standardized to help support efforts for central clearing of CDS trades as noted by Colozza (2013). The effect of these changes on my study is unclear so I test in Table XVI if there were any difference in the CDS market reaction between the pre and post "Big Bang" period. The results suggest that the market participants haven't changed their reaction to credit rating events.

4 Methodology

4.1 Stock Abnormal Returns

In order to evaluate the abnormal stock returns around the event date I use the standard event study approach as proposed by Brown and Warner (1980, 1985). Date 0 is the day in which a rating event occurs. With this knowledge I can create event time windows which I use to analyze market reaction. In the previous literature the event time window was defined as either the time period around the rating event or the period before the event. In this paper I show the results with the time windows of [-1,1],[-1] and [0]. [-30,-10], [-10,-2], [2,10],[10,30] windows results are displayed in Table IV and Table V. The window [-1,1] seems to be the most used in recent works because it captures both possible anticipation of the event and the next day reaction. I do not know at which time of the day the rating change announcement is made so including the day after it is necessary to analyze the market reaction without losing possible information. I use the "OLS Market Model" to evaluate abnormal performance.

Abnormal daily market returns are thus defined as:

$$AR_{i,t} = R_{i,t} - \hat{\beta}_i R_{m,t} - R_{f,t}, \tag{1}$$

where $R_{i,t}$ is the return of firm i during period t, $R_{m,t}$ is the return of the market during period t, $R_{f,t}$ is the risk free return during period t and $\hat{\beta}_i$ is OLS values from the estimation period. I estimate Beta during the trading day window [-250, -121].

4.2 Bond Abnormal Returns

To evaluate the bond market reaction I use the mean adjusted model introduced by Handjinicolaou and Kalay (1984). This model is currently the most frequently used method of calculating abnormal bond returns, accounting for term structure changes.

In the mean-adjusted return model, the abnormal return is calculated as the historical return on the security less the return to the matched Treasury security with the most similar maturity date. The premium holding period return (PBR) for bond i during period t is calculated as the bond's return (BR), minus the return on a matched Treasury security:

$$PBR_i = BR_i - TR_i \tag{2}$$

The mean expected excess return (EBR) for bond i is then evaluated as:

$$EBR_i = (\sum_{t=-1}^{-y} PBR_{i,t})\frac{1}{y} \tag{3}$$

Once the mean expected excess return is evaluated the abnormal bond return (ABR), for bond i will be calculated as the difference between the premium holding period return (PBR) and the expected excess return:

$$ABR_i = PBR_i - EBR_i \tag{4}$$

The basic assumption behind this model is that the bond earns a constant premium over the matched Treasury security. Consistent with Bassembinder, Kahle, Maxwell and Xu (2008) I estimated the mean adjusted model using a 126 day window requiring at least 30 days with transactions. Using this procedure allows me to evaluate abnormal return for each bonds in my sample. Given that, for the purpose of this study I am focusing on bond market reaction at the firm level, I employ the firm level approach to perform my analysis. According to this method every firm in the sample is treated as a portfolio: once the abnormal return for each bond is calculated the entity's abnormal return is the value weighted average of the abnormal returns to the different bond issues. Thus the abnormal return for entity k on the event window is calculated as:

$$ABR_k = \sum_{i=1}^{j} ABR_i w_i \tag{5}$$

I also evaluate abnormal bond returns using the matched portfolio model approach. The results are qualitatively similar so I do not report them.

Two different problems arose using the previously described method to evaluate the bond market reaction. First, I was not able to retrieve from TRACE the size of the bond. The abnormal bond results at firm level were actually evaluated as equally weighted rather than bond size weighted (in the "matched portfolio model" approach the matching portfolios were equally weighted). Second, TRACE provides the clean price and not the dirty price so the result does not include accrued interest. Using the clean price to construct abnormal bond returns adds noise to my results because bond prices are not corrected for accrued interest. Furthermore bond prices are based on trades-which may be a source of non-synchroneity. Because of these two issues we may expect the CDS market to convey a more efficient reaction to rating changes. I also evaluated the bond market reaction deriving the abnormal return from bond yield rather than from bond price in order to account for accrued interest but the yield variable on TRACE dataset is only reliable after November 3, 2008. After that date the yield to maturity (YTM) is automatically evaluated but before was manually imported by transaction operators who may use another method to report that variable. Using the post November 2008 data shrinks significantly my sample so I decided to do the analysis on bond price rather than bond yield.

4.3 Credit Default Swap Abnormal Returns

In order to mitigate some of the issues of the bond database I also evaluate the bond market reaction using the CDS spread changes. I follow Ismailescu and Kazemi

(2010) where the abnormal return for firm i period t is calculated as follow. First I evaluate the change in Credit Default Swap Spread around the rating change event and the firm i CDS returns.

$$\Delta CDSspread_{i,t} = CDSspread_{i,t} - CDSspread_{i,t-1} \tag{6}$$

$$R_{i,t} = \frac{\Delta CDSspread_{i,t}}{CDSspread_{i,t-1}} \tag{7}$$

Then I create an equally weighted portfolio M consisting of all the entities that possess a CDS spread at time t and I evaluate the index-adjusted CDS spread change.

$$AR_{i,t} = R_{i,t} - R_{M,t}$$

The CDS used to employ the previous results will be the five years ones since is the most liquid market. Using this procedure allows me to have cross-sectional consistency and I will not have the "missing transaction" problem that affect the daily bond dataset.

4.4 Hazard Modeling

Survival models relate time that passes before some event occurs to one or more covariates that may be associated with that quantity of time. The advantage to use such a methodology in my analysis is that the passage of time is a key factor in order to better understand credit rating agencies' behavior. In my study the event will be either a S&P's downgrade or an upgrade and time is measured as the number of days since the last rating change. As explanatory variables I will use: previous rating change (upgrade or downgrade), current credit rating and competitor credit rating change. In a proportional hazards model, the unique effect of a unit increase in a covariate is multiplicative with respect to the hazard rate:

$$h_X(t) = h_0(t)e^{\sum_i X_i \beta_i}, \tag{8}$$

where $h_X(t)$ is the hazard rate of X and $h_0(t)$ is the baseline hazard rate function. The model is based on the assumption that the baseline hazard function depends on time, t, but the predictor variables do not. I am using this model to test if the previous rating change and the current rating (my predictors variables - not time dependent) affect the hazard rate.

The coefficient estimates are found by maximizing the likelihood function of the model. The likelihood function for the proportional hazards regression model is based on the observed order of events. It is the product of likelihood of a failure estimated for each failure time. If there are n failures at n distinct failure times, then the likelihood is:

$$L = (\frac{h(t_1)}{\sum_{i=1}^{n} h(t_i)})(\frac{h(t_2)}{\sum_{i=2}^{n} h(t_i)}) \cdots (\frac{h(t_n)}{h(t_n)}) \tag{9}$$

We can use a likelihood ratio test to assess the significance of adding a term or terms in a model. Consider the two models where the first model has p predictive variables and the second model has p + r predictive variables. I can also evaluate the hazard ratio (HR) that represents the relative risk of instant failure for individuals or items having the predictive variable value X compared to the ones having the baseline values.

$$HR = \frac{h_0(t)e^{X_i\hat{b}}}{h_0(t)e^{X_0\hat{b}}} \tag{10}$$

$$HR = e^{(X_i - X_0)\hat{b}} \tag{11}$$

Thus $\exp((X_i - X_0)\hat{b})$ is the relative odds of observations with X = i relative to X = 0.

In a non-proportional hazards model, the unique effect of a unit increase in a covariate is not multiplicative with respect to the hazard rate. The model is based on the assumption that both the baseline hazard function and the predictor variables depends on time.

$$h_X(t) = h_0(t)e^{\sum_i X_i(t)\beta_i} \tag{12}$$

I use this model to test if a change in credit rating made by a competitor (my predictors variable - now time dependent) affect the hazard rate.

4.5 Competing Risks

Competing risks concern the situation where more than one cause of state change is possible. The subject of competing risks goes as far back as the 18th century, when Bernoulli (1760) studied the possible consequences of eradication of smallpox on mortality rates. The problem of estimation of state change probabilities after elimination (or modification) of one of the competing risks has been of great importance and has been the subject of much debate in the 1970s [14]. The central criticism is the assumption that upon removal of one cause of state change, the probabilities of state change of the remaining causes is unchanged. While this may be a reasonable assumption in certain settings (industrial as example), in my setting it is important to consider the two possible state changes contemporaneously.

In Table XIII and Table XIV I analyze the effect of different covariates on the probability of a rating change of an issuer using two separate models: one for the downgrades and one for the upgrades. Caution is needed in estimating the probability of the event of interest occurring in the presence of these so-called competing risks. Treating the events of the competing causes as censored observations will lead to a bias in the Kaplan–Meier estimate if one of the fundamental assumptions underlying the Kaplan–Meier estimator is violated: the assumption of independence of the time to event and the censoring distributions. If the competing event time distributions were independent of the distribution of time to the event of interest, this would imply that at each point in time the hazard of the event of interest is the same for issuers whose ratings are unchanged, as for issuers that have experienced a competing event by that time.

[14] Gail M., A review and critique of some models used in competing risk analysis, *Biometrics*, 1975 and Prentice R.L., Kalbfleisch J.D., Peterson A.V., Flournoy N., Farewell V.T. and Breslow N.E., The analysis of failure times in the presence of competing risks, *Biometrics*, 1978.

However, an issuer that is censored because of a competing risk will with certainty not experience the event of interest. Since issuers that do not experience a downgrade (because they have experienced an upgrade) are treated as if they could experience it (they are censored), the Kaplan–Meier overestimates the probability of downgrade (and hence underestimates the corresponding survival probability). The bias is greater when the competition is heavier, i.e. when the hazard of the competing events (e.g., upgrade) is larger. This bias can be noted by comparing the coefficient estimates for the investment grade indicator and previous change indicator of Table XIV versus the same coefficient estimates of Table XV. Using a competing risks model is then the most reasonable choice for my study.

The observable data in competing risks models is represented by the time of failure T, the cause of failure C, and a covariate vector Z. Inference therefore is to be based on the joint distribution of T and C, given Z. The fundamental concept in competing risks models is the cause-specific hazard function, the hazard of failing from a given cause in the presence of the competing events.

$$h_{Xk}(t) = \lim_{\delta t \to 0} \frac{Prob(t \leq T < t + \delta t, C = k | T \geq t)}{\delta t} \tag{13}$$

The cause-specific hazard is estimable from the data and constitutes all relevant information that can be observed from the data. Anything that can be uniquely determined by the cause-specific hazards is estimable. Define the cumulative cause-specific hazard by:

$$H_X(t) = \int_0^t h_X(s)\, ds \tag{14}$$

and define:

$$S_X(t) = exp(-H_X(t)) \tag{15}$$

Note that, although $S_X(t)$ can be estimated, it should not be interpreted as a marginal survival function; it only has this interpretation if the competing event time distributions and the censoring distribution are independent. In that case, the marginal distribution describes the event time distribution in the situation that the competing events do not occur. Furthermore, define:

$$S(t) = exp(-\sum_{k=1}^{K} H_X(t)) \tag{16}$$

This survival function does have an interpretation; it is the probability of not having changed state from any cause at time t. The cumulative incidence function of cause k, $I_k(t)$, is defined by the probability $Prob(T \leq t, C = k)$ of failing from cause k before time t. It can be expressed in terms of the cause specific hazard as:

$$I_k(t) = \int_0^t h_X(s)S(s)\, ds \tag{17}$$

Several alternative names have been used for this function, for example 'crude cumulative incidence function' or 'subdistribution function'. The latter name has its origin in the fact that the cumulative probability to fail from cause k remains below one, $I_k(\text{inf}) = Prob(D = k)$, hence it is not a proper probability distribution.

Note that, as events from causes other than k are treated as censored, the naive Kaplan–Meier estimate of the probability of failing from cause k before or at time t is estimating:

$$1 - S_X(t) = \int_0^t h_X(s)S_k(s)\, ds \tag{18}$$

The difference with the cumulative incidence function $I_k(t)$ from equation (17) is that $S(s)$ is replaced by $S_k(s)$. Since $S(t) \leq S_k(t)$, we have $I_k(t) \leq 1 - S_k(t)$, with equality at t if there is no competition, i.e. if $\sum_{j=1,j\neq k}^{K} H_j(t) = 0$.

The cumulative incidence function is used extensively in calculating state and prediction probabilities in multi-state models. Competing risks models are a special case of multi-state models and the cumulative incidence approach has been termed the multi-state approach to competing risks.

The next step is estimating the cumulative incidence functions. Let $0 < t_1 < t_2 < ... < t_N$ be the ordered distinct time points at which a change in state – of any cause – occurs. Let c_{kj} denote the number of issuers changing state from cause k at t_j, and let $c_j = \sum_{k=1}^{K} c_{jk}$ denote the total number of state changes (from any cause) at t_j. In the absence of ties only one of the c_{kj} equals 1 for a given j, and $c_j = 1$. The formulas are also valid in the presence of ties. Let n_j be the number of firms at risk (i.e. that have not changed state from any cause) at time t_j. The overall survival probability $S(t)$ at t can be estimated, without considering the cause of failure, by the Kaplan–Meier estimator:

$$\hat{S}(t) = \prod_{j:t,j \leq t} (1 - \frac{d_j}{n_j}) \tag{19}$$

Consider a discretized version of the cause-specific hazard of equation (13):

$$h_X(t) = Prob(T = t_j, D = k | T > t_{j-1}) \tag{20}$$

This quantity would be estimated by:

$$\hat{h}_X(t_j) = \frac{d_{kj}}{n_j} \tag{21}$$

the proportion of subjects at risk that change state due to cause k. Note that (19) can also be written down as:

$$\hat{S}(t) = \prod_{j:t,j \leq t} (1 - \sum_{k=1}^{K} \hat{h}_X(t_j)) \tag{22}$$

The unconditional probability of changing state from cause k at t_j, $p_k(t_j) = Prob(T = t_j, D = k)$ is the product of the hazard and the probability of being event-free at t_j, and is estimated as:

$$\hat{p}_k(t_j) = \hat{h}_k(t_j)\hat{S}(t_{j-1}) \tag{23}$$

Finally, the cumulative incidence $I_k(t)$ of cause k at t is estimated as the sum of these terms for all time points before t; in summary:

$$\hat{I}(t) = \sum_{j:t,j\leq t} \hat{p}_k(t_j), \qquad \hat{p}_k(t_j) = \hat{h}_k(t_j)\hat{S}(t_{j-1}), \qquad \hat{h}_k(t_j) = \frac{d_{kj}}{n_j} \tag{24}$$

Like in standard survival analysis, the effect of one or two binary covariates is most easily investigated by estimating cumulative incidence curves non-parametrically and testing whether the curves differ by covariate value. Gray (1988) developed a log-rank type test for equality of cumulative incidence curves. If the covariate is continuous or the simultaneous effect of several covariates on cause-specific failure is of interest, a competing risks analogue of a Cox proportional hazards model is the most logical choice. Since the cause-specific hazards are identifiable, regression on the cause-specific hazards is possible.

In Table XIII and Table XIV I analyze S&P dowgrades and upgrades separately as if there were only one cause of state change, either downgrade or upgrade. Using a competing risk model (or its generalization: the multi-state model) I analyze S&P downgrades and upgrades contemporaneously in Table XV. I represent a competing risks and multi-state model graphically with an initial state (initial rating) and two different endpoints (upgrade and downgrade) in Figure 2.

5 Results

In Table IV I analyze stock and bond markets reaction to upgrades and downgrades. In this table I only focus on upgrades and downgrades and not on reviews because I want to be able to isolate those events that are unanticipated from those that are anticipated. The rationale behind this analysis is that, given the confirmation likelihood of a negative (positive) watchlist showed in Table I, I expect weak market reaction when the downgraded (upgraded) entity is already under review while I expect a strong reaction when the downgrade (upgrade) is unanticipated or consist of more than one notch downgrade (upgrade). During my sample period there occurred 894 long term downgrades, 338 short term downgrades, 636 long term upgrades and 117 short term upgrades. This disparity between upgrades and downgrades and long versus short term should not be surprising given the analyzed period (two downgrade waves) and the fact that fewer entities use commercial paper compared to those which use bonds. I run the following regression:

$$AR_{i,t} = \alpha + \beta_1(I_{un}) + \beta_2(I_{mu}) + \epsilon_i \tag{25}$$

Where $AR_{i,t}$ represents the stock, bond or CDS abnormal returns in the event window t for firm i, I_{un} is an indicator variable that take the value of 1 if the event was not anticipated by a watchlist placement and I_{mu} is an indicator variable that take the value of 1 if the event consist of more than one notch change. Consistent with the results in the literature I find significant negative stock and bond market reaction to long and short term rating downgrade. The effect regarding long term downgrade events is almost entirely driven by the unanticipated events and multi notch events that, according to Table I Panel A, represent around 38% of all the downgrade events. In contrast with the long term downgrade events the reaction to short term rating downgrade events does not appear to be driven by unanticipated events. The choice of the time window does not appear to significantly change the result and show that anticipation effect is present. In contrast with previous findings I find significant positive reaction to long term upgrade events. As can be seen from Table IV panel B the effect is present only in the unanticipated subset of events. Short term upgrade events show the same effect as the long term upgrade events.

In table V I focus on a type of credit rating event that is not anticipated: when an entity is placed under review (watchlisted). I run the following regression:

$$AR_{i,t} = \alpha + \beta_1(I_{co}) + \epsilon_i \tag{26}$$

Where $AR_{i,t}$ represents the stock, bond or CDS abnormal return in the event window t for firm i and I_{co} is an indicator variable that take the value of 1 if the review is subsequently confirmed. During my sample period I observe 1206 negative watchlist placement (818 long term, 388 short term) and 261 positive watchlist placement (217 long term, 44 short term). Ex ante I would expect the market reaction to negative watchlisting to be lower than the market reaction to unanticipated downgrades because once an entity is placed under negative review it has, on average, 40% chance to keep the current rating. The results on Panel A are not entirely consistent with my ex ante expectations. On Panel A The intercept value, that represents those watchlisting that end up not being "confirmed" is -0.0215 and it is similar than the sum of the intercept and the unanticipated indicator variable of the preceding table but once the reviews that end up being confirmed are considered the values goes to above the preceding table one.This result suggests that markets are able to predict the outcome of the credit rating agencies reviews. Both the confirmed coefficients are significant but their effect is opposite. For the negative reviews, being confirmed, increase the stock market negative reaction to the placement news while for positive reviews it decrease the positive market reaction, as if the market participants were only surprised by those positive placement that do not end up being confirmed. The bond market does not react as the equity market to reviews and the anticipation effect is not present around those types of credit events. Based on the fact that the stock and bond market reaction seems to be driven by the unanticipated events the results presented from Table VI will only consider those unanticipated events.

In Table VI I analyze possible variation in stock and bond market reaction across rating agencies. I run the following regression:

$$AR_{i,t} = \beta_1(I_{sp}) + \beta_2(I_{fi}) + \beta_3(I_{mo}) + \epsilon_i \tag{27}$$

Where $AR_{i,t}$ represents the stock, bond or CDS abnormal return in the event window t for firm i, I_{sp} is an indicator variable that take the value of 1 if the event is generated by S&P, I_{fi} is an indicator variable that take the value of 1 if the event is generated by Fitch and I_{mo} is an indicator variable that take the value of 1 if the event is generated by Moody's. The three credit rating agencies analyzed in this study are different in size, may have different focuses and they may have different reputational capital thus a priori it is not clear if the stock and bond markets reaction should be the similar. In Panel A – that consider unanticipated downgrade and negative watchlist placement - I find that it does not appears to be variation in stock market reaction among rating agencies to what concerns long term rating changes but if we consider the reaction on the bond market or we focus on short term rating changes then it does appear that Fitch is not influencing market participants. The anticipation effect is only significant for Standard & Poor's Rating Services. In Panel B – that consider unanticipated upgrade and positive watchlist placement – I find significant markets reaction only to what concerns long term rating changes made by S&P and Moody's.

In Table VII I analyze if the credit rating grade affects market's reaction. In Panel A I take every credit rating event – downgrades, upgrades and reviews – and I regress the abnormal return around the event against the post event numeric grade.

$$AR_{i,t} = \sum_{n=1}^{19} \beta_n(I_n) + \epsilon_i \tag{28}$$

The most significant reactions occur when the ex-ante grade is the highest (AAA) or when the change involves losing the investment grade (BBB-). The reaction to upgrades or positive reviews is less prominent but again the strongest stock market reaction occurs when the change involve gaining the investment grade. Lastly in Panel B I regress the abnormal returns around the credit rating events on three indicator variables: investment grade, change, non-investment grade.

$$AR_{i,t} = \beta_1(I_{in}) + \beta_2(I_{ch}) + \beta_3(I_{ni}) + \epsilon_i \tag{29}$$

Where $AR_{i,t}$ represents the stock, bond or CDS abnormal return in the event window t for firm i, I_{in} is an indicator variable that take the value of 1 if the rating event involves investment grade entities, I_{ch} is an indicator variable that take the value of 1 if the rating event changes the credit rating from investment grade to non investment grade or vice versa and I_{ni} is an indicator variable that take the value of 1 if the event involves non investment grade entities. Using that partition we can see that the strongest stock market reaction happens when the entity goes from investment grade to non-investment grade (or vice versa in case of upgrades). Non investment grade entities seem to have, on average, a stronger reaction to rating changes than the investment grades ones.

In table VIII I test the Ederington and Goh (1993) hypothesis: long-term debt rating downgrades may make stockholders better off, thus generating a positive stock price reaction, if the downgrade does not convey new negative information about earnings or sales but instead reflects increased leverage. Panel A shows that even though the market reaction to downgrades related to fundamental changes is stronger than the market reaction to leverage reasons, the latter effect does not impact positively the equity markets as predicted by the Ederington and Goh (1993) hypothesis. I run the following regression:

$$AR_{i,t} = \beta_1(I_{fu}) + \beta_2(I_{le}) + \beta_3(I_{ot}) + \epsilon_i \quad (30)$$

Where $AR_{i,t}$ represents the stock, bond or CDS abnormal return in the event window t for firm i, I_{fu} is an indicator variable that take the value of 1 if the rating event change was due to a fundamental change, I_{le} is an indicator variable that take the value of 1 if the rating event change was due to leverage reasons and I_{ot} is an indicator variable that take the value of 1 if the rating event change was due to other reasons.

In Table IX I analyze if there is information in those announcements that were made subsequently to another similar announcement for the same entity by a different credit rating agency. The analyzed subset comprehend only those firm that were followed by all the three agencies.

$$AR_{i,t} = \alpha + \beta_1(I_{su}) + \beta_2(I_{ch}) + \beta_3(I_{su})(I_{ch}) + \epsilon_i \quad (31)$$

Where $AR_{i,t}$ represents the stock, bond or CDS abnormal return in the event window t for firm i, I_{su} is an indicator variable that take the value of 1 if there is at least one announcement from a different credit rating agency in the preceding 90 days of the credit rating event, I_{ch} is an indicator variable that take the value of 1 if the rating event changes the credit rating from investment grade to non investment grade. In Panel C, D and E I report the 14, 30 and 60 days windows for the downgrade and negative watch-list placement events. The results are qualitatively similar and the overall inference does not change. During the sample period I observed a total of 1302 unanticipated downgrades or negative reviews (846 long term, 456 short term) and 589 unanticipated upgrades or positive reviews (493 long term, 96 short term). The intercept coefficient of Panel A is negative and significant meaning that we see both stock and bond market reaction to those unanticipated events. According to the results in Panel A the subsequent announcement has incremental information. One possible explanation is the set of constraints written into institutional investors' investment policies.. Commonly, in order to fall into category of admissible stock, these policies require a certain credit rating grade from two out of the three most popular rating agencies. The other possible reason is that the markets see the subsequent announcement as a confirmation of the first one thus clearing the possible doubts generated by the rating mismatch. In order to disentangle the two preceding hypothesis I test if the subsequent news reaction is significantly different when an entity's credit rating goes from investment grade to non investment or vice versa. The interaction between the two indicator terms is significant hence the regulatory thesis cannot be rejected.

Another channel through which changes in ratings can affect the market is regulation. In Table X I create an indicator variable that is equal to one if the entity, after the event, lose or gain eligibility for rule 2a-7.

$$AR_{i,t} = \alpha + \beta_1(I_{el}) + \epsilon_i \tag{32}$$

The results show that those unanticipated rating changes that involve Money Market Funds ability to invest in Commercial Paper do have incremental effect on the market suggesting that the rule 2a-7 is affecting the Commercial Paper market. This effect is stronger for the downgrades than for the upgrades where it is significant at the 10% level.

In table XI I run the following regression:

$$\begin{aligned} AR_{i,t} = \alpha + \beta_1(I_{un}) + \beta_2(I_{un})(I_{S\&P}) + \beta_3(I_{un})(I_{Fitch}) + \beta_4(I_{un})(I_{moody}) \\ + \beta_5(I_{un})(I_{Cont}) + \beta_4(I_{un})(I_{Change}) + \beta_4(I_{Change})(I_{Sub}) + \epsilon_i \end{aligned} \tag{33}$$

Where $AR_{i,t}$ represents the stock, bond or CDS abnormal return in the event window t for firm i. The event is defined as long term rating downgrade or negative watchlist placement for Panel A and as either long term rating upgrade or positive watchlist placement for Panel B. Unanticipated is an indicator variable that take the value of 1 if the downgrade (upgrade) event was not anticipated by a placement on negative (positive) watchlist. Contemporaneous is an indicator variable that takes the value of one if the long term credit event was contemporaneously announced with a short term credit event. Change is an indicator variable that takes the value of one if long term credit event makes the issuer going from investment grade to non investment grade or vice versa. Subsequent is an indicator variable that takes the value of 1 if there is at least one announcement from a different credit rating agency in the preceding 90 days of the credit rating event. The results of Table XI - Panel A - confirm that the markets does not react differently based on the rating agency that generated the event. Also, it shows that there is a significant reaction when the event is unanticipated and it changes the issuer rating from investment to non-investment and when the change indicator interact with the subsequent indicator. The latter result is suggesting that the institution investment policies may be affecting the markets reactions. In Panel B upgrades and positive watchlist are considered and the only significant term is the interaction between the change indicator and the subsequent indicator.

In Table XII I run the same regression as in Table XI but the event is defined as short term rating downgrade or negative watchlist placement for Panel A and as either short term rating upgrade or positive watchlist placement for Panel B. The results of this table are consistent with the long term table but less significant. This is confirming that market participants seem to react stronger to long term rating changes than to short term rating changes.

The finding that markets react to unanticipated shocks that drop the issuer below investment grade is not a new result but is a well-known phenomenon in the literature.

Jorion and Zhang (2007) found that effects of bond rating changes should take into account the rating prior to the announcement. Specifically, they provide theoretical support for different price effects as a non-linear function of the prior credit rating and they find much stronger information effects, measured by stock price effects, for rating changes for low-rated firms relative to high-rated firms. Ambrose, Cai and Helwege (2008) studying those issuer whose bond are downgraded to junk status – called "fallen angels" by practitioner - document substantially greater selling activity in fallen angel bonds around the time of the downgrade than in comparable bonds that are not downgraded. However, they also find that the level of bond trading activity is sufficiently low that a relatively small number of trades could result in a statistically significant effect and when they consider the overall magnitude of fallen angel sales activity relative to insurance company holdings. They conclude that regulatory pressure does not result in the wholesale liquidation of fallen angel holdings. In a following paper - Cai and Helwege (2012) - they attribute their results to the fact that trades occur when fundamentals are unchanged and dealers know that the sales are not motivated by private information about future returns.

In the last part of my study I use hazard modelling to understand the effect of different explanatory variables on credit ratings. For this part of the analysis I use only Standard and Poor's credit rating changes. The choice is on S&P because it represents the largest portion of my events database. I first use the proportional hazard model with time invariant variables then I use the non proportional hazard model to gauge the effect of the other two agencies, Moody's and Fitch, on the S&P's credit rating changes. Lastly I use a competing risks and multi-state model approach.

Table XIII Panel A shows the results of the proportional hazard regression using competitor credit rating changes as explanatory variables (indicator variable equal to 1 in case of previous upgrade and equal to 0 otherwise) and the current rating (indicator variable equal to 1 in case of investment grade and equal to 0 otherwise) as explanatory variables. All the p-values are below 0.02 suggesting that the explanatory variables selected are affecting the hazard rate. The relative risk values are also economically significant. For example, the relative risk of an upgrade in the case of a previous upgrade (in the right censored environment) is 114%.

In Table XIV I show the results for the non-proportional regression using competitor credit rating change as explanatory variable. We can notice that while all rating agencies significantly affect the hazard rate of other companies rating changes the effect is stronger for S&P and Moody's than for Fitch. This result can be link to those in table VI where I found that the market reaction is stronger if the rating change event is generated by either S&P or Moody's.

6 Conclusion

The evidence from this paper is generally consistent with the strand of the literature that supports the view that rating agencies possess inside information. Under this view, credit rating agencies are able to evaluate the issuer financial situation better than the markets. Credit ratings thus represent a forward looking measure because they convey new information to markets.

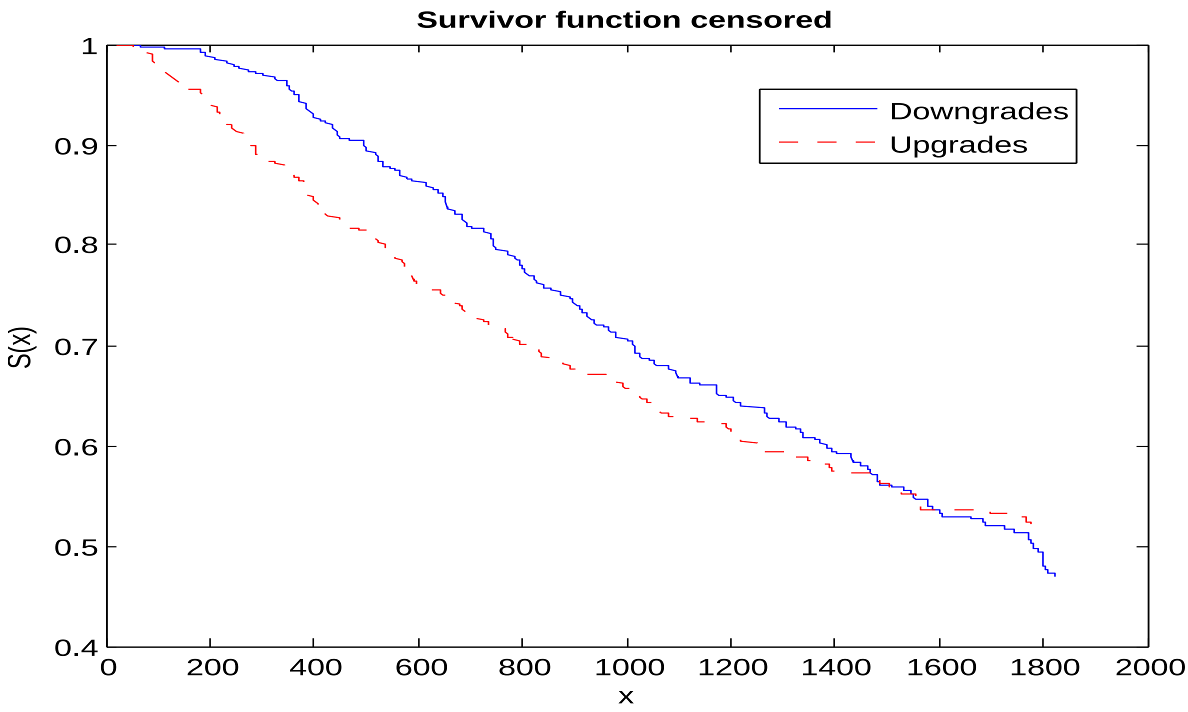
I find that not all the rating change events carry new information: only those which I identify as unanticipated. I also find that unanticipated upgrades do have an impact on the stock market. This evidence is a finding that, to my knowledge, was not shown in previous works. Credit ratings events affect significantly the bond market, as we would expect, but not as strongly as the equity market. I show that both stock and bond markets react not only to long term rating changes but are sensible to short term rating changes too.

This study analyzes the rating changes of the three most popular Nationally Recognized Statistical Rating Organizations: S&P, Fitch and Moody's. I show that the reaction to the announcement is different based on which of the three rating agencies has generate the event and based on the post announcement grade.

I track the rationale behind the rating changes in order to be able to test Goh and Ederington (1993) and I find stronger markets reactions for those rating changes related to firm fundamental changes than for those related to leverage. Furthermore I investigate if the observed markets reactions can be fully attributed to the information hypothesis and/or to a regulatory hypothesis. I find that subsequent announcements have a significant incremental effect if they change the issuer grade from investment to non-investment (or vice versa). This result suggests that the regulatory environment has some effect on the market reaction to rating changes.

Lastly I use both the proportional and non-proportional hazard rate models to study whether the probability of a rating change is affected by different factors. I find that both the direction of the previous change, the current rating and a competitor rating change affect the probability of a rating change. The last findings of the paper suggest that studies that consider a company credit rating as explanatory variable may not be able to fully capture the riskiness of the firm due to the imperfect assumption that credit ratings are Markovian.

Figure 1 Censored Survival and Hazard function – Downgrade and Upgrade.



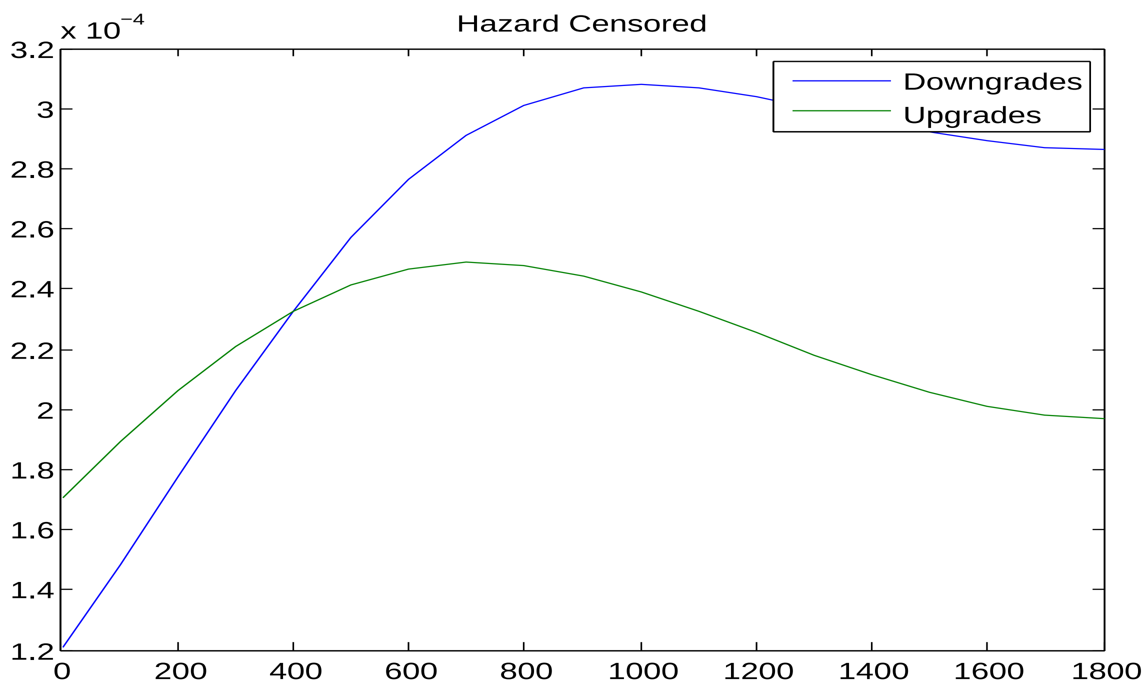


Figure 2 Competing Risks and Multi-State Models

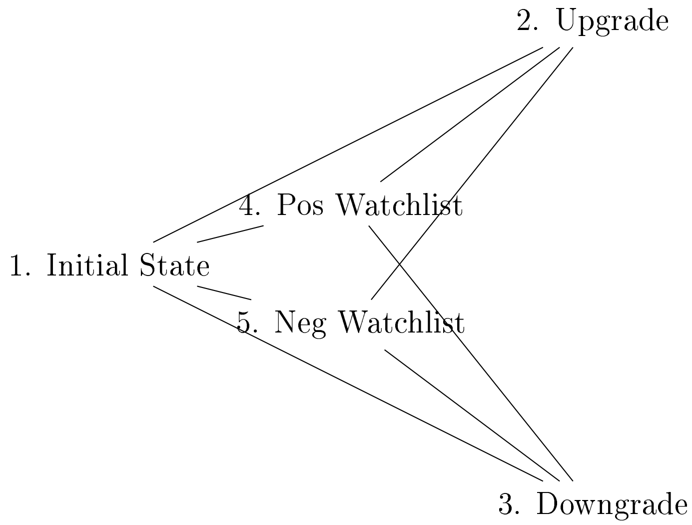
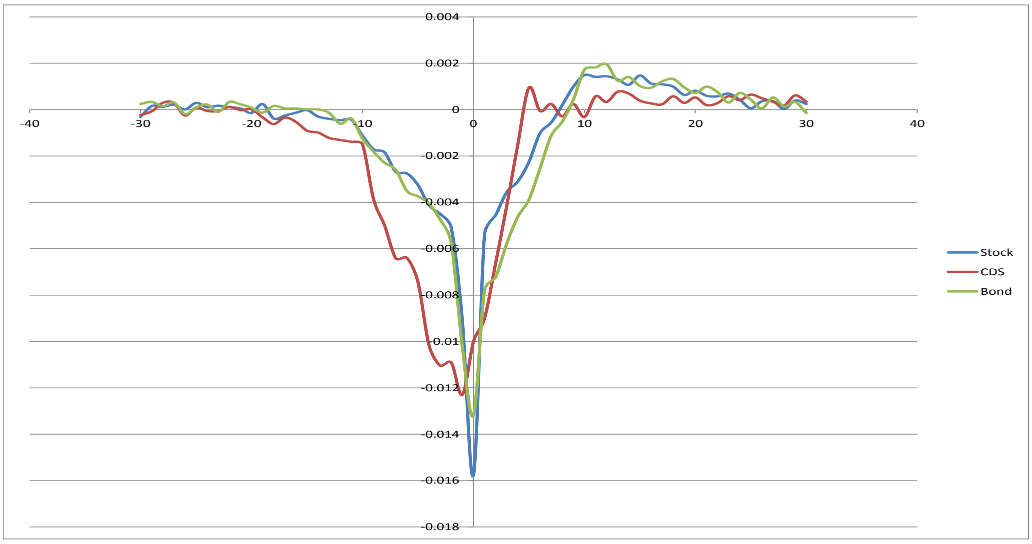


Figure 3 Cumulative Abnormal Return - Long Term Events

Downgrades



Upgrades

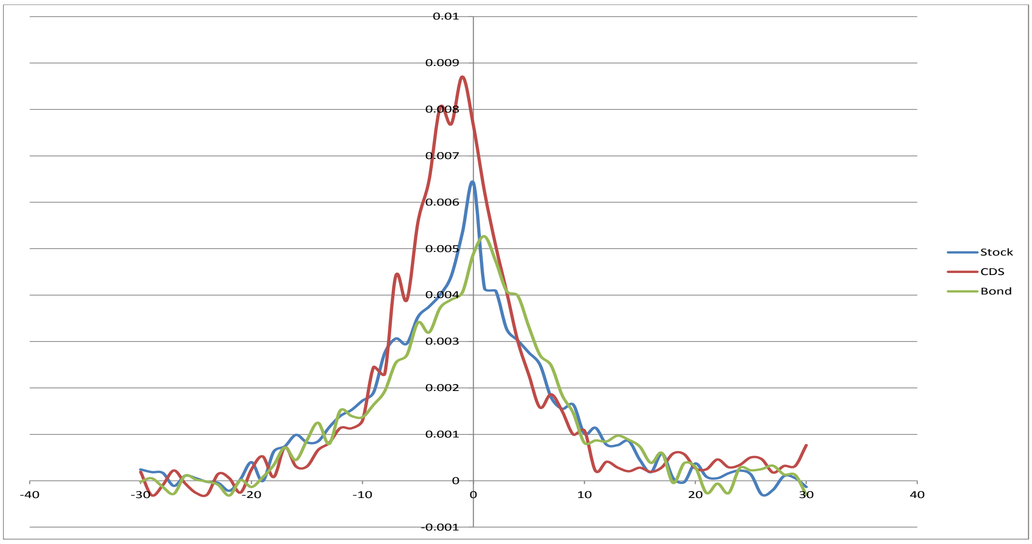


TABLE I Summary Statistics - Credit Rating Events

This table presents summary statistics for credit ratings events. Panel A shows the summary statistics by agencies while Panel B shows summary statistics by term.

Panel A:Changes in both long and short term ratings by agencies. Jan 2000 - Sept 2012

	All Agencies		S&P		Moody's		Fitch		
Total ratings changes	2097		1273		566	258			
Ratings upgrades	812	38.72%	518	40.69%	202	35.69%	92	35.66%	of total ratings changes
- *Upgrade anticipated*	240	29.56%	125	24.13%	99	49.01%	16	17.39%	of upgrades
- *Upgrade unanticipated*	572	70.44%	393	75.87%	103	50.99%	76	82.61%	of upgrades
Ratings downgrades	1285	61.28%	755	59.31%	364	64.31%	166	64.34%	of total ratings changes
- *Downgrade anticipated*	788	61.32%	415	54.97%	294	80.77%	79	47.59%	of upgrades
- *Downgrade unanticipated*	497	38.68%	340	45.03%	70	19.23%	87	52.41%	of upgrades
Watchlist positive	278		148		112		18		
- Confirmed	240	81.91%	125	81.16%	99	87.61%	16	61.53%	of positive w/l
- Not confirmed	53	18.08%	29	18.83%	14	12.38%	10	38.46%	of positive w/l
- Unresolved*	-15		-6		-1		-8		
Watchlist negative	1294		749		407		138		
- Confirmed	788	60.42%	415	55.63%	294	69.93%	79	57.66%	of negative w/l
- Not confirmed	516	39.57%	331	44.36%	127	30.16%	58	42.33%	of negative w/l
- Unresolved*	-10		3		-14		1		

Panel B: Changes credit ratings by term. All Agencies. Jan 2000 - Sept 2012

	Long Term		Short Term		
Total ratings changes	1615		482		
Ratings upgrades	681	42.17%	131	27.18%	of total ratings changes
- *Upgrade anticipated*	203	29.81%	37	28.24%	of upgrades
- *Upgrade unanticipated*	478	70.19%	94	71.76%	of upgrades
Ratings downgrades	934	57.83%	351	72.82%	of total ratings changes
- *Downgrade anticipated*	569	60.92%	219	62.39%	of upgrades
- *Downgrade unanticipated*	365	39.08%	132	37.61%	of upgrades
Watch list positive	228		50		
- Confirmed	203	84.58%	37	69.81%	of positive w/l
- Not confirmed	37	15.41%	16	30.18%	of positive w/l
- Unresolved*	-12		-3		
Watch list negative	869		425		
- Confirmed	569	64.07%	219	52.64%	of negative w/l
- Not confirmed	319	35.92%	197	47.35%	of negative w/l
- Unresolved*	-19		9		

TABLE II Summary Statistics –Announcement Timing

This table presents summary statistics of the timing of credit ratings announcement by rating agencies.

	S&P		Moody's		Fitch	
Total announcement	2434		1184		451	
First announcer						
Total	1657	68.08%	647	54.65%	234	51.88%
LT&ST contemporaneously	1326	80.02%	510	78.82%	197	84.18%
LT	316	19.07%	120	18.54%	34	14.53%
ST	15	0.90%	17	2.61%	3	1.28%
Subsequent announcer						
Total	777	31.92%	537	45.35%	217	48.12%
LT	545	70.14%	363	67.59%	150	69.12%
ST	232	29.85%	174	32.40%	67	30.87%
Average delay (days)	45.68		46.44		39.75	

TABLE III Summary Statistics – Bond Sample

This table presents summary statistics for the bond sample analyzed in this study.

Grade	**Maturity**							
	0 < x <= 5		5 < x <= 10		x > 10		All	
Investment								
# Bonds	431	12.22%	228	6.47%	2099	59.53%	2758	78.22%
Coupon Rate		3.42%		4.88%		5.48%		5.11%
Maturity(days)		1612		2688		7595		6254
Non-Investment								
# Bonds	406	11.51%	144	4.08%	218	6.18%	768	21.78%
Coupon Rate		2.55%		5.49%		6.17%		4.13%
Maturity(days)		735		2754		9024		3466
All								
# Bonds	837	23.74%	372	10.55%	2317	65.71%	3526	100.00%
Coupon Rate		3.00%		5.12%		5.54%		4.90%
Maturity(days)		1187		2714		7729		5647

TABLE IV Stock and Bond Markets reaction to upgrades and downgrades

$$AR_{i,t} = \alpha + \beta_1(I_{un}) + \beta_2(I_{mu}) + \epsilon_i$$

This table summarizes the coefficient estimates. The dependent variable is the stock or bond abnormal return for the selected window around the event. The event is defined as credit rating downgrade for panel A, as credit rating upgrade for panel B. Unanticipated is an indicator variable that take the value of 1 if the downgrade (upgrade) event was not anticipated by a placement on negative (positive) watchlist. Multi Notch is an indicator variable that take the value of 1 if the if the downgrade (upgrade) consist of more than one notch decrease (increase). T-Values are presented in parenthesis.

Panel A: Credit Rating Downgrade

Rating Event	Long Term					Short Term				
Market		Stock		CDS	Bond		Stock		CDS	Bond
Window	[-1,1]	[-1]	[0]	[-1,1]	[-1,1]	[-1,1]	[-1]	[0]	[-1,1]	[-1,1]
Intercept	-0.0039	-0.0010	-0.0021	0.0034	-0.0048	-0.0122	-0.0036	-0.0089	0.0017	-0.0266
	(-0.711)	(-0.317)	(-0.607)	(0.687)	(-0.905)	(-1.807)*	(-1.035)	(-1.775)*	(0.365)	(-2.265)**
Unanticipated	-0.0222	-0.0093	-0.0081	0.0476	-0.0290	-0.0090	-0.0013	0.0000	0.0014	-0.0153
	(-2.765)***	(-2.133)**	(-1.639)	(3.456)***	(-2.956)***	(-0.834)	(-0.230)	(-0.001)	(0.215)	(-1.465)
Multi Notch	-0.0259	-0.0109	-0.0137	0.0405	-0.0346	-0.1614	-0.0706	-0.0570	0.0348	-0.1368
	(-2.830)***	(-2.208)**	(-2.437)**	(4.245)***	(-3.123)***	(-7.437)***	(-6.262)***	(-3.524)***	(2.684)***	(-5.436)***
N	894	894	894	894	894	338	338	338	338	338
RSQ	0.0168	0.0102	0.0093	0.0125	0.0225	0.0143	0.0104	0.0355	0.0116	0.0126

Panel B: Credit Rating Upgrade

Rating Event	Long Term					Short Term				
Market		Stock		CDS	Bond		Stock		CDS	Bond
Window	[-1,1]	[-1]	[0]	[-1,1]	[-1,1]	[-1,1]	[-1]	[0]	[-1,1]	[-1,1]
Intercept	-0.0001	0.0004	-0.0012	-0.0014	-0.0001	-0.0068	-0.0019	0.0003	-0.0064	-0.0016
	(-0.042)	(0.221)	(-0.723)	(-0.795)	(-0.026)	(-1.463)	(-0.770)	(0.143)	(-1.324)	(-0.065)
Unanticipated	0.0065	0.0018	0.0039	-0.0246	0.0013	0.0106	0.0017	0.0013	-0.0098	0.0010
	(1.9781)**	(0.867)	(1.975)**	(-1.725)*	(-0.432)	(1.925)*	(0.583)	(0.453)	(-1.558)	(-0.359)
Multi Notch	0.0044	0.0007	0.0038	-0.0235	0.0026	0	0	0	0	0
	(0.893)	(0.231)	(1.280)	(1.673)*	(-0.654)	0	0	0	0	0
N	636	636	636	636	636	117	117	117	117	117
RSQ	0.0056	0.0013	0.0063	0.0073	0.0055	0.0307	0.0029	0.0018	0.0346	0.0269

Panel C: Long Term Credit Rating Dowgrade

Rating Event	Long Term											
Market	Stock				CDS				Bond			
Window	[-30,-11]	[-10,-2]	[2,10]	[11,30]	[-30,-11]	[-10,-2]	[2,10]	[11,30]	[-30,-11]	[-10,-2]	[2,10]	[11,30]
Intercept	-0.0030	-0.0135	0.0097	0.0154	0.0115	0.0385	0.0078	-0.0122	-0.0095	-0.0185	0.0015	0.0192
	(-0.588)	(-2.971)***	(1.505)	(2.845)***	(1.426)	(3.115)***	(0.526)	(-1.345)	(-1.215)	(-1.985)*	(0.152)	(1.845)*
Unanticipated	-0.0064	0.0003	0.0013	-0.0074	0.0034	-0.0026	0.0022	0.0015	0.0058	0.0017	-0.0042	0.0064
	(-0.780)	(0.040)	(0.126)	(-0.854)	(0.345)	(-0.189)	(0.093)	(0.132)	(0.639)	(0.121)	(-0.514)	(0.963)
Multi Notch	-0.0075	-0.0013	-0.0007	-0.0045	0.0048	-0.0017	0.0011	0.0015	0.0062	0.0005	-0.0023	0.0078
	(-0.915)	(-0.209)	(-0.093)	(-0.534)	(0.519)	(-0.121)	(0.098)	(0.148)	(0.715)	(0.052)	(-0.185)	(1.135)
N	894	894	894	894	894	894	894	894	894	894	894	894
RSQ	0.0112	0.0095	0.0010	0.0089	0.0256	0.0115	0.0098	0.0116	0.0198	0.0126	0.0113	0.0097

Panel D: Long Term Credit Rating Upgrade

Rating Event	Long Term											
Market	Stock				CDS				Bond			
Window	[-30,-11]	[-10,-2]	[2,10]	[11,30]	[-30,-11]	[-10,-2]	[2,10]	[11,30]	[-30,-11]	[-10,-2]	[2,10]	[11,30]
Intercept	0.0074	0.0090	0.0031	-0.0030	-0.0054	-0.0217	-0.0025	0.0010	0.0063	0.0186	-0.0025	-0.0058
	(1.517)	(2.769)***	(0.9974)	(-0.667)	(-0.926)	(-1.823)*	(-0.535)	(0.138)	(1.128)	(1.775)*	(-0.256)	(-0.863)
Unanticipated	0.0047	-0.0020	0.0021	0.0058	0.0028	0.0055	-0.0014	-0.0034	-0.0012	-0.0036	0.0024	0.0029
	(0.815)	(-0.514)	(0.565)	(1.077)	(0.513)	(1.268)	(-0.235)	(-0.668)	(-0.139)	(-0.869)	(0.324)	(0.414)
Multi Notch	0.0063	0.0009	0.0029	0.0049	0.0037	0.0063	-0.0019	-0.0049	-0.0036	-0.0047	0.0021	0.0019
	(1.098)	(0.101)	(0.611)	(0.826)	(0.663)	(1.426)	(-0.342)	(-0.815)	(-0.222)	(-1.012)	(0.268)	(0.345)
N	636	636	636	636	636	636	636	636	636	636	636	636
RSQ	0.0099	0.0135	0.0086	0.0112	0.0216	0.0198	0.0075	0.0096	0.0156	0.0175	0.0139	0.0096

Panel E: Short Term Credit Rating Dowgrade

Rating Event	Long Term											
Market	Stock				CDS				Bond			
Window	[-30,-11]	[-10,-2]	[2,10]	[11,30]	[-30,-11]	[-10,-2]	[2,10]	[11,30]	[-30,-11]	[-10,-2]	[2,10]	[11,30]
Intercept	-0.0018	-0.0178	-0.0006	0.0197	0.0026	0.0199	-0.0026	-0.0056	-0.0009	-0.0154	-0.0016	0.0135
	(-0.213)	(-2.650)***	(-0.053)	(2.229)***	(0.198)	(2.034)**	(-0.359)	(-0.726)	(-0.116)	(-1.732)*	(-0.269)	(1.569)
Unanticipated	-0.0037	-0.0033	0.0214	-0.0107	-0.0015	-0.0028	0.0026	0.0049	-0.0021	-0.0045	0.0115	-0.0026
	(-0.273)	(-0.303)	(1.130)	(-0.748)	(-0.068)	(-0.386)	(0.426)	(0.638)	(-0.218)	(-0.579)	(0.863)	(-0.315)
Multi Notch	-0.0042	-0.0039	0.0145	-0.0094	-0.0026	-0.0046	0.0035	0.0068	-0.0012	-0.0034	0.0096	-0.0009
	(-0.371)	(-0.326)	(0.957)	(-1.126)	(-0.147)	(-0.346)	(0.589)	(0.816)	(-0.126)	(-0.426)	(0.792)	(-0.085)
N	338	338	338	338	338	338	338	338	338	338	338	338
RSQ	0.0156	0.0135	0.0094	0.0121	0.0112	0.0096	0.0121	0.0248	0.0063	0.0163	0.0153	0.0178

Panel F: Short Term Credit Rating Upgrade

Rating Event	Long Term											
Market	Stock				CDS				Bond			
Window	[-30,-11]	[-10,-2]	[2,10]	[11,30]	[-30,-11]	[-10,-2]	[2,10]	[11,30]	[-30,-11]	[-10,-2]	[2,10]	[11,30]
Intercept	-0.0026	0.0100	0.0133	0.0082	0.0035	-0.0065	-0.074	-0.0037	-0.0007	0.0058	0.0064	0.0046
	(-0.294)	(1.474)	(2.035)**	(0.907)	(0.318)	(-0.863)	(-1.116)	(-0.463)	(-0.065)	(0.637)	(0.716)	(0.555)
Unanticipated	0.0111	-0.0104	-0.0081	-0.0049	-0.0036	0.0079	0.0016	0.0063	0.0156	-0.0126	-0.0065	-0.0031
	(1.030)	(-1.287)	(-1.051)	(-0.459)	(-0.426)	(0.899)	(0.232)	(0.681)	(1.436)	(-1.312)	(-0.846)	(-0.511)
Multi Notch	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
N	117	117	117	117	117	117	117	117	117	117	117	117
RSQ	0.0124	0.0082	0.0068	0.0079	0.0093	0.0112	0.0115	0.0218	0.0085	0.0185	0.0096	0.0118

TABLE V Stock and Bond Markets reaction to negative and positive watchlist placement

$$AR_{i,t} = \alpha + \beta_1(I_{co}) + \epsilon_i$$

This table summarizes the coefficient estimates. The dependent variable is the stock or bond abnormal return for the selected window around the event. The event is defined as negative watchlist placement for Panel A and as positive watchlist placement for Panel B. Confirmed is an indicator variable that take the value of 1 if the watchlist is subsequently confirmed. T-Values are presented in parenthesis.

Panel A: Negative Watchlist placement

Rating Event	Long Term					Short Term				
Market	Stock			CDS	Bond	Stock			CDS	Bond
Window	[-1,1]	[-1]	[0]	[-1,1]	[-1,1]	[-1,1]	[-1]	[0]	[-1,1]	[-1,1]
Intercept	-0.0215	-0.0058	-0.0116	0.0467	-0.0135	-0.0183	-0.0093	-0.0046	0.0248	-0.0092
	(-3.111)***	(-1.715)*	(-2.495)**	(3.975)***	(-1.746)*	(-2.247)**	(-2.392)**	(-0.836)	(1.982)**	(-1.135)
Confirmed	-0.0156	-0.0076	-0.0070	0.0151	-0.0168	-0.0159	-0.0042	-0.0132	0.0148	-0.0029
	(-1.811)*	(-1.814)*	(-1.201)	(1.789)*	(-1.965)*	(-1.416)	(-0.779)	(-1.734)*	(1.498)	(-0.76)
N	818	818	818	818	818	388	388	388	388	388
RSQ	0.0040	0.0040	0.0018	0.0031	0.0027	0.0051	0.0016	0.0077	0.0043	0.0066

Panel B: Positive Watchlist placement

Rating Event	Long Term					Short Term				
Market	Stock			CDS	Bond	Stock			CDS	Bond
Window	[-1,1]	[-1]	[0]	[-1,1]	[-1,1]	[-1,1]	[-1]	[0]	[-1,1]	[-1,1]
Intercept	0.0351	0.0093	0.0222	-0.0340	0.0027	0.0663	0.0208	0.0416	-0.0312	-0.0007
	(3.005)***	(1.192)	(3.272)***	(-2.769)***	(0.473)	(2.885)***	(1.722)*	(3.586)***	(-3.065)***	(-0.368)
Confirmed	-0.0357	-0.0098	-0.0231	0.0082	0.0013	-0.0756	-0.0182	-0.0498	0.0015	0.0004
	(-2.806)***	(-1.157)	(-3.123)***	(0.192)	(0.269)	(-2.74)***	(-1.26)	(-3.582)***	(0.634)	(0.675)
N	217	217	217	217	217	44	44	44	44	44
RSQ	0.0350	0.0061	0.0430	0.0642	0.0568	0.1458	0.0348	0.2258	0.3482	0.1322

Panel C: Long Term Negative Watchlist placement

Rating Event	Long Term											
Market	Stock				CDS				Bond			
Window	[-30,-11]	[-10,-2]	[2,10]	[11,30]	[-30,-11]	[-10,-2]	[2,10]	[11,30]	[-30,-11]	[-10,-2]	[2,10]	[11,30]
Intercept	-0.0043	-0.0125	0.0005	0.0054	0.0096	0.0216	0.0035	-0.0045	-0.0075	-0.0136	0.0011	0.0063
	(-0.642)	(-2.326)***	(0.042)	(0.663)	(0.991)	(1.696)*	(0.563)	(-0.671)	(-0.931)	(-1.598)	(0.099)	(0.942)
Confirmed	-0.0047	-0.053	-0.0024	0.0116	0.0026	0.0007	-0.0019	-0.0075	-0.0063	-0.0046	-0.0026	0.0149
	(-0.778)	(-0.815)	(-0.325)	(1.826)*	(0.332)	(0.068)	(-0.118)	(-0.683)	(-0.547)	(-0.439)	(-0.345)	(1.721)*
N	818	818	818	818	818	818	818	818	818	818	818	818
RSQ	0.0068	0.0085	0.0042	0.0026	0.0068	0.0047	0.0037	0.0082	0.0059	0.0071	0.0034	0.0053

Panel D: Long Term Positive Watchlist placement

Rating Event	Long Term											
Market	Stock				CDS				Bond			
Window	[-30,-11]	[-10,-2]	[2,10]	[11,30]	[-30,-11]	[-10,-2]	[2,10]	[11,30]	[-30,-11]	[-10,-2]	[2,10]	[11,30]
Intercept	0.0078	0.0101	0.0039	-0.0047	-0.0035	-0.0046	0.0021	0.0067	0.0089	0.0096	0.0046	-0.0025
	(1.598)	(2.635)***	(0.493)	(-0.369)	(-0.436)	(-0.569)	(-0.354)	(0.838)	(1.365)	(1.819)*	(0.426)	(-0.246)
Confirmed	0.0023	-0.0036	-0.0063	-0.0035	-0.0013	-0.0023	-0.0063	-0.0025	0.0027	-0.0045	-0.0053	-0.0043
	(0.315)	(-0.429)	(0.756)	(-0.426)	(-0.263)	(-0.426)	(-0.715)	(-0.368)	(0.352)	(-0.563)	(-0.671)	(-0.585)
N	217	217	217	217	217	217	217	217	217	217	217	217
RSQ	0.0042	0.0056	0.0096	0.0035	0.0045	0.0063	0.0034	0.0024	0.0065	0.0046	0.0036	0.0053

Panel E: Short Term Negative Watchlist placement

Rating Event	Long Term											
Market	Stock				CDS				Bond			
Window	[-30,-11]	[-10,-2]	[2,10]	[11,30]	[-30,-11]	[-10,-2]	[2,10]	[11,30]	[-30,-11]	[-10,-2]	[2,10]	[11,30]
Intercept	-0.0027	-0.0115	0.0035	0.0045	-0.0075	-0.0166	-0.0026	0.0024	-0.0056	-0.0096	0.0025	0.0042
	(-0.331)	(-1.989)**	(0.377)	(0.441)	(-0.693)	(-1.589)	(-0.256)	(0.296)	(-0.524)	(-1.196)	(0.315)	(0.563)
Confirmed	-0.0035	-0.048	-0.0018	0.0099	-0.0025	-0.0016	0.0027	0.0063	-0.0052	-0.0036	-0.0019	0.0106
	(-0.551)	(-0.635)	(-0.357)	(1.496)*	(-0.428)	(-0.269)	(0.296)	(0.728)	(-0.604)	(-0.592)	(-0.311)	(1.569)
N	388	388	388	388	388	388	388	388	388	388	388	388
RSQ	0.0048	0.0026	0.0067	0.0110	0.0098	0.0048	0.0052	0.0055	0.0032	0.0056	0.0018	0.0068

Panel F: Short Term Positive Watchlist placement

Rating Event	Long Term											
Market	Stock				CDS				Bond			
Window	[-30,-11]	[-10,-2]	[2,10]	[11,30]	[-30,-11]	[-10,-2]	[2,10]	[11,30]	[-30,-11]	[-10,-2]	[2,10]	[11,30]
Intercept	0.0064	0.0091	0.0032	-0.0027	-0.0029	-0.0039	0.0017	0.0057	0.0077	0.0062	0.0035	-0.0021
	(1.163)	(1.756)*	(0.326)	(-0.332)	(-0.350)	(-0.416)	(0.245)	(0.893)	(1.425)	(1.235)	(0.462)	(-0.158)
Confirmed	0.0017	-0.0029	-0.0054	-0.0026	-0.0005	-0.0018	-0.0052	-0.0018	0.0024	-0.0038	-0.0049	-0.0038
	(0.286)	(-0.325)	(0.685)	(-0.315)	(-0.068)	(-0.326)	(-0.635)	(-0.215)	(0.298)	(-0.429)	(-0.593)	(-0.458)
N	44	44	44	44	44	44	44	44	44	44	44	44
RSQ	0.0112	0.0098	0.0108	0.0163	0.0282	0.0038	0.0056	0.0058	0.0042	0.0093	0.0171	0.0036

TABLE VI Stock and Bond Markets reaction to unanticipated events – Rating Agencies

$$AR_{i,t} = \beta_1(I_{sp}) + \beta_2(I_{fi}) + \beta_3(I_{mo}) + \epsilon_i$$

This table summarizes the coefficient estimates. The dependent variable is the stock or bond abnormal return for the selected window around the event. The event is defined as either unanticipated downgrade or negative watchlist placement for Panel A and as either unanticipated upgrade or positive watchlist placement for Panel B. S&P is an indicator variable that takes the value of 1 if the event was generated by Standard & Poor's Ratings Services. Fitch is an indicator variable that takes the value of 1 if the event was generated by Fitch. Moody's is an indicator variable that takes the value of 1 if the event was generated by Moody's Investors Service. The regression does not contain an intercept. T-Values are presented in parenthesis.

Panel A: Unanticipated downgrade and negative watchlist placement

Rating Event	Long Term					Short Term				
Market	Stock			CDS	Bond	Stock			CDS	Bond
Window	[-1,1]	[-1]	[0]	[-1,1]	[-1,1]	[-1,1]	[-1]	[0]	[-1,1]	[-1,1]
S&P	-0.0294 (-6.358)***	-0.0109 (-4.614)***	-0.0141 (-4.81)***	0.0659 (6.819)***	-0.0196 (-4.999)***	-0.0297 (-4.591)***	-0.0098 (-3.249)***	-0.0156 (-3.428)***	0.0596 (4.763)***	-0.0166 (-2.266)**
Fitch	-0.0216 (-2.131)**	-0.0064 (-1.227)	-0.0171 (-2.661)**	0.0158 (2.172)**	-0.0145 (-1.456)	-0.0140 (-0.98)	-0.0043 (-0.639)	-0.0061 (-0.609)	0.0114 (1.529)	-0.0027 (-0.459)
Moody's	-0.0195 (-2.783)**	-0.0055 (-1.529)	-0.0117 (-2.639)**	0.0486 (3.729)***	-0.0216 (-3.698)***	0.0093 (-2.82)**	-0.0154 (-3.56)***	-0.0062 (-0.954)	0.0526 (4.382)***	-0.0082 (-1.713)*
N	1143	1143	1143	1143	1143	532	532	532	532	532
RSQ	0.0441	0.0215	0.0315	0.0526	0.0550	0.0535	0.0426	0.0239	0.0638	0.0429

Panel B: Unanticipated upgrade and positive watchlist placement

Rating Event	Long Term					Short Term				
Market	Stock			CDS	Bond	Stock			CDS	Bond
Window	[-1,1]	[-1]	[0]	[-1,1]	[-1,1]	[-1,1]	[-1]	[0]	[-1,1]	[-1,1]
S&P	0.0047 (1.941)*	0.0017 (1.111)	0.0024 (1.698)*	-0.0287 (-2.935)***	0.0015 (0.946)	0.0042 (0.641)	0.0022 (0.648)	0.0013 (0.391)	-0.0144 (-1.345)	0.0012 (0.468)
Fitch	0.0025 (0.447)	0.0003 (0.077)	0.0003 (0.098)	-0.0056 (-0.762)	0.0002 (0.158)	0.0196 (1.253)	0.0061 (0.774)	0.0091 (1.118)	-0.0092 (-0.347)	0.0046 (0.952)
Moody's	0.0091 (2.435)**	0.0029 (1.208)	0.0037 (1.687)*	-0.0193 (-1.745)*	0.0046 (0.862)	0.0096 (0.995)	0.0027 (0.546)	0.0060 (1.189)	-0.0126 (-1.194)	0.0072 (0.893)
N	664	664	664	664	664	128	128	128	128	128
RSQ	0.0147	0.0041	0.0086	0.0258	0.0068	0.0229	0.0103	0.0217	0.0354	0.0158

TABLE VII Stock and Bond Markets reaction to unanticipated events – Rating Grades

$$AR_{i,t} = \sum_{n=1}^{19} \beta_n(I_n) + \epsilon_i$$

This table summarizes the coefficient estimates. The dependent variable is the stock or bond abnormal return for the selected window around the event. The event is defined as either a downgrade(upgrade) or a watchlist placement. The indicators represent the numeric grade after the announcement. The regression does not contain an intercept. T-Values are presented in parenthesis.

Panel A-1: All Ratings Events by numeric grade - Downgrade or negative watchlist

	Downgrade or negative watchlist					
Rating Event	Long Term			Short Term		
Market	Stock			Stock		
Window	[-1,1]	[-1]	[0]	[-1,1]	[-1]	[0]
2	-0.0792 (-2.663)***	-0.0072 (-0.465)	-0.0707 (-3.689)***	-0.0346 (-2.021)**	-0.0069 (-0.844)	-0.0216 (-1.81)*
3	-0.0348 (-0.974)	-0.0111 (-0.6)	-0.0197 (-0.856)	-0.0098 (-1.409)	-0.0066 (-1.963)**	-0.0051 (-1.048)
4	-0.0173 (-0.913)	-0.0054 (-0.547)	-0.0076 (-0.626)	-0.0143 (-2.527)**	-0.0070 (-2.586)**	-0.0042 (-1.068)
5	-0.0190 (-1.451)	-0.0045 (-0.657)	-0.0100 (-1.19)	-0.0418 (-4.945)***	-0.0091 (-2.246)**	-0.0245 (-4.158)***
6	-0.0117 (-1.263)	-0.0121 (-2.523)**	-0.0026 (-0.441)	-0.0941 (-3.946)***	-0.0278 (-2.435)***	-0.0171 (-1.027)
7	-0.0145 (-2.016)**	-0.0082 (-2.216)**	-0.0082 (-1.762)*	-0.3173 (-3.137)***	-0.1988 (-4.1)***	-0.1192 (-1.691)*
8	-0.0160 (-2.218)**	-0.0074 (-1.993)**	-0.0035 (-0.745)			
9	-0.0175 (-2.531)**	-0.0066 (-1.838)*	-0.0080 (-1.791)*			
10	-0.0114 (-1.657)*	0.0005 (0.15)	-0.0090 (-2.041)*			
11	-0.0390 (-4.521)***	-0.0094 (-2.101)**	-0.0195 (-3.511)***			
12	-0.0464 (-3.796)***	-0.0109 (-1.721)*	-0.0233 (-2.986)***			
13	-0.0360 (-2.864)***	-0.0185 (-2.852)**	-0.0057 (-0.701)			
14	-0.0059 (-0.429)	0.0006 (0.079)	-0.0060 (-0.673)			
15	-0.0469 (-2.796)***	-0.0149 (-1.725)*	-0.0310 (-2.875)***			
16	-0.0414 (-1.59)	-0.0146 (-1.083)	-0.0235 (-1.405)			
17	0.0911 (3.5)***	0.0492 (3.661)***	0.0185 (1.105)			
18	0.0210 (0.553)	0.0087 (0.444)	0.0134 (0.547)			
19	-0.1086 (-2.677)***	-0.0260 (-1.243)	-0.0503 (-1.928)*			
N	1623	1623	1623	722	722	722
RSQ	0.0602	0.0326	0.0385	0.0795	0.0513	0.0357

Panel A-2: All Ratings Events by numeric grade - Upgrade or positive watchlist

	Upgrade or positive watchlist					
Rating Event	Long Term			Short Term		
Market	Stock			Stock		
Window	[-1,1]	[-1]	[0]	[-1,1]	[-1]	[0]
1	0.0059	0.0066	0.0005	0.0079	-0.0074	0.0157
	(0.191)	(0.342)	(0.025)	(0.741)	(-0.939)	(1.972)*
2	-0.0011	-0.0064	0.0132	-0.0011	-0.0004	0.0009
	(-0.02)	(-0.192)	(0.369)	(-0.228)	(-0.105)	(0.259)
3	-0.0026	0.0000	-0.0042	0.0055	0.0022	0.0003
	(-0.172)	(-0.004)	(-0.427)	(1.255)	(0.693)	(0.08)
4	-0.0030	-0.0017	-0.0024	-0.0046	-0.0029	-0.0042
	(-0.309)	(-0.28)	(-0.367)	(-0.44)	(-0.369)	(-0.535)
5	0.0205	0.0096	0.0046	0.0000	0.0000	0.0000
	(3.101)***	(2.349)**	(1.048)	(0)	(0)	(0)
6	-0.0023	0.0016	-0.0033	-0.1546	-0.0706	-0.0291
	(-0.488)	(0.559)	(-1.042)	(-2.777)***	(-1.719)*	(-0.703)
7	0.0039	-0.0032	0.0069			
	(0.84)	(-1.12)	(2.245)**			
8	0.0000	0.0004	0.0007			
	(0)	(0.184)	(0.267)			
9	0.0078	0.0033	0.0009			
	(1.932)*	(1.315)	(0.341)			
10	0.0098	0.0048	0.0059			
	(1.99)**	(1.57)	(1.789)*			
11	-0.0013	0.0012	-0.0002			
	(-0.253)	(0.371)	(-0.057)			
12	0.0042	0.0022	-0.0030			
	(0.705)	(0.599)	(-0.767)			
13	0.0107	0.0029	0.0051			
	(1.312)	(0.583)	(0.93)			
14	0.0154	-0.0076	0.0218			
	(1.704)	(-1.353)	(3.617)***			
15	0.0593	0.0169	0.0482			
	(4.561)***	(2.095)**	(5.577)***			
16	0.0727	0.0511	0.0276			
	(5.074)***	(5.766)***	(2.896)***			
17	-0.0597	-0.0060	-0.0285			
	(-1.114)	(-0.18)	(-0.798)			
18	0.1786	0.0236	0.1443			
	(3.331)***	(0.711)	(4.047)***			
N	1146	1146	1146	357	357	357
RSQ	0.0671	0.0437	0.0669	0.0275	0.0124	0.0131

Panel B: Unanticipated downgrade and negative watchlist placement by post announcement grade type

Rating Event			Long Term					Short Term		
Market		Stock		CDS	Bond		Stock		CDS	Bond
Window	[-1,1]	[-1]	[0]	[-1,1]	[-1,1]	[-1,1]	[-1]	[0]	[-1,1]	[-1,1]
investment grade	-0.0183	-0.0065	-0.0090	0.0351	-0.0195	-0.0134	-0.0066	-0.0075	0.0327	-0.0086
	(-6.198)***	(-4.247)***	(-4.764)***	(4.698)***	(-4.755)***	(-2.054)**	(-2.116)**	(-1.654)*	(3.982)***	(-2.127)***
change	-0.0464	-0.0109	-0.0233	0.0682	-0.0265	-0.0143	-0.0070	-0.0042	0.0416	-0.0112
	(-3.765)***	(-1.713)*	(-2.974)***	(2.597)***	(-2.983)***	(-2.509)**	(-2.561)**	(-1.068)	(2.239)**	(-1.989)**
non-investment	-0.0209	-0.0065	-0.0107	0.0637	-0.0246	-0.0493	-0.0124	-0.0243	0.0407	-0.0156
	(-2.878)***	(-1.746)*	(-2.294)**	(2.967)***	(-1.996)**	(-6.165)***	(-3.213)***	(-4.38)***	(2.953)***	(-2.879)***
N	1143	1143	1143	1143	1143	532	532	532	532	532
RSQ	0.0358	0.0145	0.0220	0.0468	0.0393	0.0627	0.0286	0.0308	0.0548	0.0328

Panel C: Unanticipated upgrade and positive watchlist placement by post announcement grade type

Rating Event			Long Term					Short Term		
Market		Stock		CDS	Bond		Stock		CDS	Bond
Window	[-1,1]	[-1]	[0]	[-1,1]	[-1,1]	[-1,1]	[-1]	[0]	[-1,1]	[-1,1]
investment grade	0.0038	0.0014	0.0013	-0.0152	0.0005	0.0079	-0.0074	0.0157	-0.0086	0.0018
	(1.905)*	(1.136)	(0.995)	(-1.997)***	(0.437)	(0.734)	(-0.937)	(1.976)*	(-1.340)	(0.953)
change	0.0098	0.0048	0.0059	-0.0391	0.0084	-0.0011	-0.0004	0.0009	-0.0156	0.0026
	(1.951)*	(1.551)	(1.75)*	(-1.783)**	(0.586)	(-0.226)	(-0.105)	(0.259)	(-1.562)	(0.436)
non-investment	0.0113	0.0040	0.0068	-0.0453	0.0095	0.0032	0.0011	-0.0006	-0.0265	0.0053
	(3.552)***	(2.048)**	(3.231)***	(-2.879)***	(1.539)	(0.777)	(0.37)	(-0.183)	(-2.396)**	(0.748)
N	664	664	664	664	664	128	128	128	128	128
RSQ	0.0170	0.0068	0.0123	0.0235	0.0534	0.0033	0.0029	0.0110	0.0358	0.0430

TABLE VIII Stock and Bond Markets reaction to unanticipated events – Changes Rationale

$$AR_{i,t} = \beta_1(I_{fu}) + \beta_2(I_{le}) + \beta_3(I_{ot}) + \epsilon_i$$

This table summarizes the coefficient estimates. The dependent variable is the stock or bond abnormal return for the selected window around the event. The event is defined as either a downgrade(upgrade) or a watchlist placement. The indicators represent the rationale behind the rating change decision. The regression does not contain an intercept. T-Values are presented in parenthesis.

Panel A: Unanticipated downgrade and negative watchlist placement

Rating Event	Long Term					Short Term				
Market		Stock		CDS	Bond		Stock		CDS	Bond
Window	[-1,1]	[-1]	[0]	[-1,1]	[-1,1]	[-1,1]	[-1]	[0]	[-1,1]	[-1,1]
Fundamental	-0.0410	-0.0254	-0.0193	0.0598	-0.0295	-0.0214	-0.0153	-0.0075	0.0256	-0.0054
	(-8.475)***	(-4.823)***	(-3.791)***	(6.349)***	(-2.268)**	(-2.475)***	(-1.751)*	(-0.934)	(2.215)**	(-0.655)
Leverage	-0.0168	-0.0099	-0.0085	0.0336	-0.0225	-0.0075	-0.0045	-0.0038	0.0095	-0.0023
	(-1.927)*	(-1.368)	(-1.126)	(3.168)***	(-1.998)**	(-1.321)	(-0.651)	(-0.054)	(0.839)	(-0.456)
Other	-0.0215	-0.0120	-0.0096	0.0435	-0.0216	-0.0045	-0.0097	0.0026	0.0198	-0.0065
	(-2.245)**	(-1.691)*	(-1.497)	(4.745)***	(-1.865)*	(-0.987)	(-1.196)	(0.354)	(-1.82)*	(-0.786)
N	973	973	973	973	973	486	486	486	486	486
RSQ	0.0561	0.0345	0.0324	0.0495	0.0438	0.0753	0.0634	0.0524	0.0791	0.0825

Panel B: Unanticipated upgrade and positive watchlist placement

Rating Event	Long Term					Short Term				
Market		Stock		CDS	Bond		Stock		CDS	Bond
Window	[-1,1]	[-1]	[0]	[-1,1]	[-1,1]	[-1,1]	[-1]	[0]	[-1,1]	[-1,1]
Fundamental	0.0089	0.0065	0.0035	-0.0293	0.0006	0.0035	0.0042	0.0012	-0.0152	0.0098
	(2.14)**	(1.696)*	(1.091)	(-2.837)***	(0.265)	(0.628)	(0.896)	(0.256)	(-1.294)	(0.963)
Leverage	0.0057	0.0034	0.0016	-0.0256	0.0026	0.0120	0.0096	0.0065	-0.0092	0.0116
	(1.743)*	(0.934)	(0.456)	(-2.364)**	(0.896)	(1.265)	(1.291)	(1.268)	(-0.956)	(0.874)
Other	0.0064	0.0048	0.0019	-0.0264	0.0016	0.0095	0.0053	0.0054	-0.0054	0.0072
	(1.923)*	(1.587)	(0.652)	(-2.456)**	(0.568)	(0.856)	(0.953)	(1.068)	(-0.496)	(0.692)
N	598	598	598	598	598	103	103	103	103	103
RSQ	0.0244	0.0095	0.0112	0.0354	0.0098	0.0321	0.0235	0.0267	0.0425	0.0130

TABLE IX Stock and Bond Markets reaction to unanticipated events - Subsequent news

$$AR_{i,t} = \alpha + \beta_1(I_{su}) + \beta_2(I_{ch}) + \beta_3(I_{su})(I_{ch}) + \epsilon_i$$

This table summarizes the coefficient estimates. The dependent variable is the stock or bond abnormal return for the selected window around the event. The event is defined as either unanticipated downgrade or negative watchlist placement for Panel A and as either unanticipated upgrade or positive watchlist placement for Panel B. Subsequent is an indicator variable that takes the value of 1 if there is at least one announcement from a different credit rating agency in the preceding 90 days of the credit rating event. Investment to non ivestment grade is an indicator varaible that takes the value of 1 if the downgrade made the firm drop to a non investment grade from an investemnt grade type of rating. Interaction is the interaction between the two indicator variables. T-Values are presented in parenthesis.

Panel A: Unanticipated downgrade and negative watchlist placement

Rating Event			Long Term					Short Term		
Market		Stock		CDS	Bond		Stock		CDS	Bond
Window	[-1,1]	[-1]	[0]	[-1,1]	[-1,1]	[-1,1]	[-1]	[0]	[-1,1]	[-1,1]
Intercept	-0.0160 (-3.589)***	-0.0060 (-2.746)***	-0.0049 (-3.026)***	0.0327 (4.368)***	-0.0189 (-4.268)***	-0.0095 (-1.786)*	-0.0047 (-1.718)*	-0.0056 (-1.631)	0.0398 (2.546)***	-0.0056 (-1.433)
Subsequent	-0.0198 (-2.983)***	-0.0083 (-2.14)**	-0.0121 (-3.113)***	0.0126 (1.197)	-0.0156 (-2.65)***	-0.0193 (-4.402)***	-0.0089 (-2.429)**	-0.0116 (-2.382)**	0.0163 (1.456)	-0.0149 (-1.597)
Investment to non investment grade	-0.0201 (-2.129)**	-0.0090 (-1.788)*	-0.0125 (-2.398)**	0.0195 (1.7953)*	-0.0162 (-2.356)**	-0.0186 (-1.586)	-0.0156 (-1.078)	-0.0211 (1.315)	0.0207 (1.892)*	-0.0154 (-1.162)
Interaction	-0.0346 (-2.145)**	-0.0179 (-1.991)*	-0.0265 (-2.268)**	0.0252 (2.495)**	-0.0193 (-2.168)**	-0.0268 (-1.786)*	-0.0169 (-1.478)	-0.0116 (-1.2698)	0.0165 (1.292)	-0.0183 (-1.598)
N	846	846	846	846	846	456	456	456	456	456
RSQ	0.0077	0.0040	0.0084	0.0095	0.0065	0.0077	0.0216	0.0210	0.0169	0.0089

Panel B: Unanticipated upgrade and positive watchlist placement

Rating Event			Long Term					Short Term		
Market		Stock		CDS	Bond		Stock		CDS	Bond
Window	[-1,1]	[-1]	[0]	[-1,1]	[-1,1]	[-1,1]	[-1]	[0]	[-1,1]	[-1,1]
Intercept	0.0049 (2.36)**	0.0016 (1.221)	0.0023 (1.866)*	-0.0319 (-2.845)***	0.0013 (1.424)	0.0052 (0.941)	0.0016 (0.581)	0.0032 (1.095)	-0.0167 (-1.209)	0.0077 (1.368)
Subsequent	0.0041 (0.799)	0.0014 (0.425)	0.0014 (0.451)	-0.0115 (-0.962)	0.0002 (0.356)	0.0160 (1.786)*	0.0081 (1.078)	0.0024 (0.315)	-0.0065 (-0.892)	0.0070 (0.942)
Non investment to investment grade	0.0013 (0.693)	0.0006 (0.398)	0.0011 (0.769)	-0.0126 (-1.462)	-0.0004 (-0.456)	0.0023 (0.986)	0.0017 (1.016)	0.0016 (0.952)	-0.0140 (-1.096)	0.0032 (1.394)
Interaction	0.0027 (0.963)	0.0037 (1.135)	0.0021 (1.335)	-0.0298 (-1.716)*	0.0012 (1.298)	0.0065 (1.477)	0.0037 (1.238)	0.0031 (1.234)	-0.0242 (-1.546)	0.0026 (1.116)
N	493	493	493	493	493	96	96	96	96	96
RSQ	0.0010	0.0003	0.0003	0.0013	0.0016	0.0091	0.0090	0.0008	0.0084	0.0075

Panel C: Unanticipated downgrade and negative watchlist placement -15 days window

Rating Event	Long Term					Short Term				
Market		Stock		CDS	Bond		Stock		CDS	Bond
Window	[-1,1]	[-1]	[0]	[-1,1]	[-1,1]	[-1,1]	[-1]	[0]	[-1,1]	[-1,1]
Intercept	-0.0119 (-2.622)***	-0.0054 (-2.773)***	-0.0061 (-2.896)***	0.0221 (2.852)***	-0.0133 (-2.178)**	-0.0053 (-1.257)	-0.0037 (-1.459)	-0.0019 (-1.126)	0.0224 (1.889)*	-0.0041 (-0.796)
Subsequent	-0.0316 (-3.174)***	-0.0129 (-2.946)**	-0.0136 (-3.241)***	0.0293 (1.734)*	-0.0163 (-2.546)***	-0.0243 (-3.632)***	-0.0109 (-3.571)***	-0.0134 (-3.397)***	0.0196 (1.942)**	-0.0149 (-2.194)**
Investment to non investment grade	-0.0219 (-2.368)**	-0.0101 (-2.034)*	-0.088 (-1.996)**	0.0214 (1.989)**	-0.0153 (-1.329)	-0.0129 (-1.015)	-0.0043 (-1.298)	-0.0052 (1.315)	0.0256 (2.111)*	-0.0139 (-1.229)
Interaction	-0.0439 (-2.884)***	-0.0172 (-2.009)**	-0.0311 (-2.441)**	0.0263 (2.217)**	-0.0207 (-2.334)**	-0.0251 (-1.911)*	-0.0142 (-1.581)	-0.0107 (-1.385)	0.0177 (1.506)	-0.0143 (-1.206)
N	846	846	846	846	846	456	456	456	456	456
RSQ	0.0101	0.0053	0.0079	0.0113	0.0053	0.0091	0.0188	0.0204	0.0139	0.0117

Panel D: Unanticipated downgrade and negative watchlist placement - 30 days window

Rating Event	Long Term					Short Term				
Market		Stock		CDS	Bond		Stock		CDS	Bond
Window	[-1,1]	[-1]	[0]	[-1,1]	[-1,1]	[-1,1]	[-1]	[0]	[-1,1]	[-1,1]
Intercept	-0.0134 (-2.986)***	-0.0071 (-3.198)***	-0.0046 (-2.698)***	0.0268 (3.128)***	-0.0110 (-2.313)**	-0.0047 (-1.094)	-0.0031 (-1.537)	-0.0019 (-0.935)	0.0298 (2.196)**	-0.0043 (-0.834)
Subsequent	-0.0268 (-3.262)***	-0.0101 (-2.711)**	-0.0121 (-3.096)***	0.0269 (1.517)	-0.0177 (-2.723)***	-0.0267 (-4.751)***	-0.0106 (-3.364)***	-0.0099 (-2.997)***	0.0185 (1.711)*	-0.0135 (-1.889)*
Investment to non investment grade	-0.0196 (-2.234**	-0.0094 (-1.864)*	-0.0119 (-2.41)**	0.0235 (2.132)**	-0.0199 (-2.676)***	-0.0142 (-1.398)	-0.0063 (-1.419)	-0.089 (1.537)	0.0231 (1.934)*	-0.0119 (-0.941)
Interaction	-0.0416 (-2.539)***	-0.0153 (-2.006)**	-0.0278 (-2.62)***	0.0287 (2.429)**	-0.0209 (-2.209)**	-0.0243 (-1.595)	-0.0094 (-1.409)	-0.0109 (-1.523)	0.0171 (1.498)	-0.0137 (-1.376)
N	846	846	846	846	846	456	456	456	456	456
RSQ	0.0116	0.0037	0.0099	0.0108	0.0073	0.0093	0.0316	0.0156	0.0218	0.0115

Panel E: Unanticipated downgrade and negative watchlist placement - 60 days window

Rating Event	Long Term					Short Term				
Market		Stock		CDS	Bond		Stock		CDS	Bond
Window	[-1,1]	[-1]	[0]	[-1,1]	[-1,1]	[-1,1]	[-1]	[0]	[-1,1]	[-1,1]
Intercept	-0.0147 (-2.787)***	-0.0062 (-2.894)***	-0.0039 (-2.287)**	0.0357 (4.789)***	-0.0138 (-2.741)***	-0.0063 (-1.495)	-0.0026 (-1.294)	-0.0031 (-1.332)	0.0436 (2.987)***	-0.0047 (-1.083)
Subsequent	-0.0223 (-2.763)***	-0.0071 (-2.496)**	-0.0109 (-2.893)***	0.0293 (1.726)*	-0.0149 (-2.916)***	-0.0219 (-4.963)***	-0.0086 (-2.629)***	-0.0121 (-3.352)***	0.0159 (1.594)	-0.0129 (-1.701)*
Investment to non investment grade	-0.0218 (-2.398)**	-0.0101 (-2.219)**	-0.0098 (-2.071)**	0.0189 (1.845)*	-0.0175 (-2.579)***	-0.0296 (-1.834)*	-0.0115 (-1.916)*	-0.0156 (2.43)**	0.0211 (1.997)*	-0.0149 (-1.371)
Interaction	-0.0386 (-2.37)**	-0.0147 (-1.834)*	-0.0233 (-2.404)**	0.0229 (2.208)**	-0.019 (-2.059)**	-0.0216 (-1.441)	-0.0109 (-1.663)*	-0.087 (-1.429)	0.0158 (1.337)	-0.0163 (-1.409)
N	846	846	846	846	846	456	456	456	456	456
RSQ	0.0089	0.0068	0.0125	0.0075	0.0049	0.0073	0.0208	0.0196	0.0144	0.0108

TABLE X Stock and Bond Markets reaction to unanticipated events - Eligibility Rule 2a-7

$$AR_{i,t} = \alpha + \beta_1(I_{el}) + \epsilon_i$$

This table summarizes the coefficient estimates. The dependent variable is the stock or bond abnormal return for the selected window around the event. The event is defined as either unanticipated downgrade or negative watchlist placement for Panel A and as either unanticipated upgrade or positive watchlist placement for Panel B. Eligibility is an indicator variable that takes the value of 1 if the current event made the entity lose elegibility from Money Market Funds. T-Values are presented in parenthesis.

Panel A: Unanticipated downgrade and negative watchlist placement

Rating Event	Short Term				
Market		Stock		CDS	Bond
Window	[-1,1]	[-1]	[0]	[-1,1]	[-1,1]
Intercept	-0.0183	-0.0086	-0.0065	0.0423	-0.0069
	(-2.920)***	(-1.763)*	(-1.596)	(2.863)***	(-1.279)
Eligibility	-0.0393	-0.0189	-0.0106	0.0375	-0.0113
	(-3.986)***	(-2.782)***	(-2.354)**	(2.917)***	(-1.369)
N	589	589	589	589	589
RSQ	0.0135	0.0370	0.0316	0.0223	0.0099

Panel B: Unanticipated upgrade and positive watchlist placement

Rating Event	Short Term				
Market		Stock		CDS	Bond
Window	[-1,1]	[-1]	[0]	[-1,1]	[-1,1]
Intercept	0.0075	0.0034	0.0029	-0.0196	0.0096
	(1.263)	(1.036)	(0.964)	(-1.393)	(1.419)
Eligibility	0.0179	0.0042	0.0037	-0.0247	0.0073
	(1.732)*	(1.345)	(1.115)	(-1.718)*	(1.194)
N	117	117	117	117	117
RSQ	0.0119	0.0296	0.0276	0.0168	0.0086

TABLE XI Long Term Events

$$AR_{i,t} = \alpha + \beta_1(I_{un}) + \beta_2(I_{un})(I_{S\&P}) + \beta_3(I_{un})(I_{Fitch}) + \beta_4(I_{un})(I_{moody}) + \beta_5(I_{un})(I_{Cont}) + \beta_6(I_{un})(I_{Change}) + \beta_7(I_{Change})(I_{Sub}) + \epsilon_i$$

This table summarizes the coefficient estimates. The dependent variable is the stock or bond abnormal return for the selected window around the event. The event is defined as long term rating downgrade or negative watchlist placement for Panel A and as either long term rating upgrade or positive watchlist placement for Panel B. Unanticipated is an indicator variable that take the value of 1 if the downgrade (upgrade) event was not anticipated by a placement on negative (positive) watchlist. Contemporaneous is an indicator variable that takes the value of one if the long term credit event was contemporaneously announced with a short term credit event. Change is an indicator variable that takes the value of one if long term credit event makes the issuer going from investment grade to non investment grade or vice versa. Subsequent is an indicator variable that takes the value of 1 if there is at least one announcement from a different credit rating agency in the preceding 90 days of the credit rating event. T-Values are presented in parenthesis..

Panel A: Long Term Downgrade and Negative Watchlist Placement

Rating Event	Long Term		
Market	Stock	CDS	Bond
Window	[-1,1]	[-1,1]	[-1,1]
Intercept	-0.0015	0.0042	-0.0045
	(-0.311)	(0.887)	(-0.905)
Unant * S&P	-0.0084	0.0097	-0.0011
	(-1.176)	(1.298)	(-0.376)
Unant * Fitch	-0.0021	0.0005	-0.0004
	(-0.498)	(0.051)	(-0.095)
Unant * Moody's	-0.0042	0.0015	-0.0021
	(-0.862)	(0.328)	(-0.675)
Unant * Contemporaneous	-0.0012	0.0045	-0.0054
	(-0.265)	(0.795)	(-1.056)
Unant * Change	-0.0347	0.0507	-0.0314
	(-2.778)***	(3.762)***	(-2.223)**
Change * Subsequent	-0.0175	0.0116	-0.0216
	(-1.783)*	(1.379)	(-1.856)*
N	1143	1143	1143
RSQ	0.0368	0.0296	0.0276

Panel B: Long Term Upgrade and Positive Watchlist Placement

Rating Event	Long Term		
Market	Stock	CDS	Bond
Window	[-1,1]	[-1,1]	[-1,1]
Intercept	-0.0003	-0.0017	0.0027
	(-0.047)	(-0.491)	(0.603)
Unant * S&P	0.0054	-0.0047	0.0034
	(1.076)	(-0.998)	(0.775)
Unant * Fitch	0.0018	-0.0034	0.0011
	(0.498)	(-0.518)	(0.195)
Unant * Moody's	0.0037	-0.0024	0.0017
	(0.891)	(-0.428)	(0.675)
Unant * Contemporaneous	0.0013	-0.0002	0.0003
	(0.265)	(-0.175)	(0.089)
Unant * Change	0.0077	-0.0095	0.0054
	(1.498)	(-1.265)	(1.076)
Change * Subsequent	0.0192	-0.0075	0.0038
	(1.997)**	(-0.975)	(0.656)
N	664	664	664
RSQ	0.0332	0.0209	0.0236

TABLE XII Short Term Events

$$AR_{i,t} = \alpha + \beta_1(I_{un}) + \beta_2(I_{un})(I_{S\&P}) + \beta_3(I_{un})(I_{Fitch}) + \beta_4(I_{un})(I_{moody}) \\ + \beta_5(I_{un})(I_{Cont}) + \beta_6(I_{un})(I_{Change}) + \beta_7(I_{Change})(I_{Sub}) + \epsilon_i$$

This table summarizes the coefficient estimates. The dependent variable is the stock or bond abnormal return for the selected window around the event. The event is defined as short term rating downgrade or negative watchlist placement for Panel A and as either short term rating upgrade or positive watchlist placement for Panel B. Unanticipated is an indicator variable that take the value of 1 if the downgrade (upgrade) event was not anticipated by a placement on negative (positive) watchlist. Contemporaneous is an indicator variable that takes the value of one if the short term credit event was contemporaneously announced with a long term credit event. Change is an indicator variable that takes the value of one if long term credit event makes the issuer going from investment grade to non investment grade or vice versa. Subsequent is an indicator variable that takes the value of 1 if there is at least one announcement from a different credit rating agency in the preceding 90 days of the credit rating event. T-Values are presented in parenthesis..

Panel A: Long Term Downgrade and Negative Watchlist Placement

Rating Event	Short Term		
Market	Stock	CDS	Bond
Window	[-1,1]	[-1,1]	[-1,1]
Intercept	-0.0075	0.0023	-0.0115
	(-1.398)	(0.652)	(-1.713)*
Unant * S&P	-0.0053	0.0011	-0.0096
	(-1.045)	(0.175)	(-1.357)
Unant * Fitch	-0.0008	0.0003	-0.0016
	(-0.259)	(0.038)	(-0.149)
Unant * Moody's	-0.0019	0.0022	-0.0011
	(-0.398)	(0.456)	(-0.219)
Unant * Contemporaneous	-0.0045	0.0027	-0.0037
	(-0.869)	(0.326)	(-0.374)
Unant * Change	-0.0138	0.0245	-0.0198
	(-1.698)*	(1.982)**	(-2.137)**
Change * Eligibility	-0.0298	0.0275	-0.0214
	(-2.532)**	(2.233)**	(-2.454)**
N	532	532	532
RSQ	0.0409	0.0335	0.0391

Panel B: Long Term Upgrade and Positive Watchlist Placement

Rating Event	Short Term		
Market	Stock	CDS	Bond
Window	[-1,1]	[-1,1]	[-1,1]
Intercept	0.0007	0.0002	0.0013
	(0.098)	(0.015)	(0.153)
Unant * S&P	0.0034	-0.0023	0.0025
	(0.689)	(-0.423)	(0.482)
Unant * Fitch	0.0009	-0.0004	0.0011
	(0.315)	(-0.119)	(0.219)
Unant * Moody's	0.0024	-0.0015	0.0021
	(0.698)	(-0.181)	(0.395)
Unant * Contemporaneous	0.0011	-0.0014	0.0021
	(0.235)	(-0.259)	(0.385)
Unant * Change	0.0049	-0.0039	0.0037
	(1.367)	(-0.948)	(0.992)
Change * Eligibility	0.0028	-0.0019	0.0014
	(0.598)	(-0.629)	(0.198)
N	128	128	1128
RSQ	0.0124	0.0226	0.0211

TABLE XIII Hazard Model - Time invariant variables

This table summarizes the coefficient estimates for proportional hazard regression. The Investment Grade indicator variable takes the value of 1 if the firm credit rating is considered investment grade and 0 otherwise. The Previous Change indicator variable takes the value of 1 if the previous rating change was an upgrade and 0 otherwise. The hazard ratio represents the relative risk of a firm having the predictive variable value X compared to the ones having the baseline values.

		Downgrade		Upgrade	
		Censored	Uncensored	Censored	Uncensored
Investment Grade		-0.4359	-0.3464	-0.7793	-0.6302
	z	-2.9346	-2.4317	-5.2029	-4.2966
	p	0.0033	0.0150	0.0000	0.0000
	hazard ratio	-35.33%	-29.27%	-54.12%	-46.84%
Previous Change		-0.5650	-0.4777	0.7605	0.6650
	z	-4.0262	-3.6736	5.0467	4.7054
	p	0.0000	0.0002	0.0000	0.0000
	hazard ratio	-43.16%	-37.97%	113.93%	94.45%

TABLE XIV Hazard Model - Time invariant and time variant variables

This table summarizes the coefficient estimates for proportional hazard regression. The rating indicator variable takes the value of 1 if the firm credit rating is considered investment grade and 0 otherwise. The previous indicator variable takes the value of 1 if the previous rating change was an upgrade and 0 otherwise. The Moodyś and Fitch indicators take the value of one if there was a downgrade (upgrade) announcement in the previous 30 days made by the respective credit rating agencies. The hazard ratio represents the relative risk of a firm having the predictive variable value X compared to the ones having the baseline values.

		Downgrade	Upgrade
Investment Grade		0.069	-0.704
	p	0.582	0.0000
	relative risk	7.13%	-50.54%
Previous Change		-0.300	0.315
	p	0.0000	0.0000
	relative risk	-25.94%	37.02%
Moody's		0.342	0.182
	p	0.0003	0.1458
	relative risk	40.79%	19.96%
Fitch		0.331	-0.051
	p	0.0134	0.7797
	relative risk	39.34%	-4.97%

TABLE XV Cox-Markov Model - Multi-state modeling

This table summarizes the coefficient estimates for Cox-Markov model regression. The rating indicator variable takes the value of 1 if the firm credit rating is considered investment grade and 0 otherwise. The previous indicator varaible takes the value of 1 if the previous rating change was an upgrade and 0 otherwise. The Moodyś and Fitch indicators take the value of one if there was a downgrade (upgrade) announcment in the previous 30 days made by the respective cradit rating agencies. Return is a variable representing the average return of the issuer in the five days preceding the credit event. Review days is a variable representing the number of days the issuer passed under review before being upgraded or downgraded. The hazard ratio represents the relative risk of a firm having the predictive variable value X compared to the ones having the baseline values.

		State Transition					
		1->2	1->3	1->4	1->5	4 ->2	5->3
Investment Grade		-0.458	0.066	-0.893	0.096	-0.119	0.075
	p	0.0000	0.6891	0.0000	0.5139	0.2698	0.6856
	relative risk	-35.81%	5.16%	-59.71%	9.68%	-9.36%	7.16%
Previous Change		0.280	-0.303	0.264	-0.311	0.087	-0.054
	p	0.0000	0.0000	0.0000	0.0000	0.4873	0.6722
	relative risk	31.76%	-23.23%	28.43%	-24.78%	10.33%	-4.72%
Moody's		0.157	0.288	0.199	0.329	0.093	0.211
	p	0.1683	0.0174	0.1356	0.0000	0.4586	0.1854
	relative risk	21.54%	32.32%	13.42%	44.48%	5.34%	14.67%
Fitch		0.134	0.258	0.176	0.287	0.114	0.169
	p	0.2289	0.0947	0.1957	0.0031	0.3963	0.1643
	relative risk	11.56%	-20.79%	9.72%	37.62%	6.14%	12.43%
Return		0.117	-0.193	0.099	-0.265	0.284	-0.198
	p	0.2276	0.0532	0.6593	0.0000	0.0000	0.0769
	relative risk	10.244%	-21.79%	4.78%	-25.63%	32.36%	-15.69%
Review days						-0.689	-0.156
	p					0.0000	0.5893
	relative risk					-46.86%	-6.79%

TABLE XVI The CDS Big Bang

$$AR_{i,t} = \alpha + \beta_1(I_{un}) + \beta_2(I_{post09}) + \beta_4(I_{un})(I_{post09}) + \epsilon_i$$

This table summarizes the coefficient estimates. The dependent variable is the CDS abnormal return for the selected window around the event. Post09 is an idicator variable that takes the value of one if the event was originated after April 8 2009. Unanticipated is an indicator variable that takes the value of 1 if the downgrade (upgrade) event was not anticipated by a placement on negative (positive) watchlist. Change is an indicator variable that takes the value of one if long term credit event makes the issuer going from investment grade to non investment grade or vice versa. Subsequent is an indicator variable that takes the value of 1 if there is at least one announcement from a different credit rating agency in the preceding 90 days of the credit rating event. T-Values are presented in parenthesis.

Rating Event	Long Term		Short Term	
	Downgrade	Upgrade	Downgrade	Upgrade
Window	[-1,1]	[-1,1]	[-1,1]	[-1,1]
Intercept	0.0039	-0.0021	0.0026	-0.0072
	(0.782)	(-0.726)	(0.981)	(-1.356)
Unant	0.0495	-0.0267	0.0125	-0.0111
	(3.423)***	(-1.857)*	(1.519)	(-1.499)
Post09	-0.0044	0.0036	-0.0016	0.0027
	(-0.693)	(0.729)	(-0.492)	(0.611)
Unant * Post09	-0.0067	0.0012	-0.0017	0.0031
	(-0.975)	(0.419)	(-0.492)	(0.715)
N	1143	664	532	128
RSQ	0.0206	0.0091	0.0978	0.0265

Appendix A - Events Definition

Single change cases	
Event code	Event description
1	Rating Upgrade, unanticipated
2	Rating Downgrade, unanticipated
3	Positive watch list
4	Negative watch list
5	Positive watch list confirmed
6	Positive watch list not confirmed
7	Negative watch list confirmed
8	Negative watch list not confirmed

Multiple change cases	
Event code	Event description
9	Rating multi upgrade, unanticipated
10	Rating multi downgrade, unanticipated
11	Positive watch list with upgrade
12	Negative watch list with downgrade
13	Positive watch list confirmed with multi upgrade
14	Negative watch list confirmed with multi downgrade
15	Positive watch list confirmed, positive watch list
16	Negative watch list confirmed, negative watch list
99	Other events

Tables Definition	
Events codes included	Event description
1 + 5 + 9 + 11 + 13 + 15	**Ratings upgrade**
5 + 13 + 15	- *Upgrade anticipated*
1 + 9 + 11	- *Upgrade unanticipated*
2 + 7 + 10 + 12 + 14 + 16	**Ratings downgrade**
7 + 14 + 16	- *Downgrade anticipated*
2 + 10 + 12	- *Downgrade unanticipated*
3 + 11 + 15	**Watch list positive**
5 + 13 + 15	- Confirmed
6	- Not confirmed
4 + 12 + 16	**Watch list negative**
7 + 14 + 16	- Confirmed
8	- Not confirmed

Appendix B - Ratings Comparison

Long term Ratings								
Agency	Rating string	Rating num	Agency	Rating string	Rating num	Agency	Rating string	Rating num
moody	Aaa	1	sandp	AAA	1	fitch	AAA	1
moody	Aa1	2	sandp	AA+	2	fitch	AA+	2
moody	Aa2	3	sandp	AA	3	fitch	AA	3
moody	Aa3	4	sandp	AA-	4	fitch	AA-	4
moody	A1	5	sandp	A+	5	fitch	A+	5
moody	A2	6	sandp	A	6	fitch	A	6
moody	A3	7	sandp	A-	7	fitch	A-	7
moody	Baa1	8	sandp	BBB+	8	fitch	BBB+	8
moody	Baa2	9	sandp	BBB	9	fitch	BBB	9
moody	Baa3	10	sandp	BBB-	10	fitch	BBB-	10
moody	Ba1	11	sandp	BB+	11	fitch	BB+	11
moody	Ba2	12	sandp	BB	12	fitch	BB	12
moody	Ba3	13	sandp	BB-	13	fitch	BB-	13
moody	B1	14	sandp	B+	14	fitch	B+	14
moody	B2	15	sandp	B	15	fitch	B	15
moody	B3	16	sandp	B-	16	fitch	B-	16
moody	Caa1	17	sandp	CCC+	17	fitch	CCC	17
moody	Caa2	18	sandp	CCC	18	fitch		18
moody	Caa3	19	sandp	CCC-	19	fitch		19
moody	Ca	20	sandp	CC	20	fitch		20
moody		21	sandp	C	21	fitch		21
moody	C	22	sandp	D	22	fitch	DDD	22
moody	/	23	sandp		23	fitch	DD	23
moody	/	24	sandp		24	fitch	D	24

Short term Ratings								
Agency	Rating string	Rating num	Agency	Rating string	Rating num	Agency	Rating string	Rating num
moody		1	sandp	A-1+	1	fitch	F1+	1
moody	P-1	2	sandp	A-1	2	fitch	F1	2
moody	P-2	3	sandp	A-2	3	fitch	F2	3
moody	P-3	4	sandp	A-3	4	fitch	F3	4
moody	NP	5	sandp	B	5	fitch	B	5
			sandp	C	6	fitch	C	6

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