THE INFORMATION VALUE OF CREDIT RATNG OUTLOOKS

by

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A dissertation submitted to the Graduate Faculty in Economics in partial fulfillment of the requirements for the degree of Doctor of Philosophy,

The City University of New York

2006

UMI Number: 3213264

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Ann Arbor, MI 48106-1346

This manuscript has been read and accepted for the

Graduate Faculty in Economics in satisfaction of the

dissertation requirement for the degree of Doctor of Philosophy.

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THE CITY UNIVERSITY OF NEW YORK

Abstract

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Agency credit ratings are used by multiple constituencies, each with their own (possibly conflicting) goals. Financial market regulators desire accurate, forward-look estimates of credit risk. While investors also desire accuracy, they also value rating stability: rating changes impose portfolio adjustment costs on investors bound by ratings-based portfolio governance rules. Rating outlooks and reviews help mitigate the potential conflict between the stability and accuracy objectives by providing indications of the likely direction and timing of future credit rating changes. Using a historical data set of Moody's ratings and rating outlooks, this dissertation seeks to answer four, heretofore unanswered questions about rating outlooks. First, this dissertation quantifies how different rating transition and default rates are when conditioned on rating history and outlook/Watchlist status. Second, the question of whether rating transition and default risk depends on rating history (serial dependence) after conditioning on outlooks and reviews is addressed. Third, we investigate how much the predictive power of Moody's credit ratings is increased by recognizing the information contained in rating outlooks and reviews. Finally, we analyze the extent to which outlook assignments affect investors' views on credit risk as reflected in credit default swap (CDS) market prices.

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1. Introduction

Credit ratings have been relied on by bond investors as indicators of relative credit risk for nearly a century. For most of their history, credit ratings alone have been relied on to measure and rank the relative creditworthiness of debt issuers. In his seminal study, Hickman (1958) showed that default rates increased monotonically with lower credit ratings. Since that pioneering work, the predictive power of rating levels and rating changes has been exhaustively studied. Much of the literature on credit ratings has focused on two, related topics: (1) the ability of agency ratings to efficiently predict default; and, (2) the reactions of market prices (or lack thereof) to rating changes.

Rating agency studies and academic research have shown that the level of the credit rating provides information about future relative default risk. Agency default studies (e.g. Hamilton and Varma (2005)) show that the level of a credit rating is a strong predictor of default as long as thirty years in advance of the event. Galil (2000) found that ratings provide better indications of future default risk than public financial information alone.

Despite the predictive power of credit rating levels, research has also shown that they are not sufficient statistics for default risk. In addition to the rating level, credit rating actions – i.e. rating upgrades and downgrades – signal changes rating agencies' opinions of relative credit risk and, therefore, realized default risk. Altman and Kao (1992) and Altman (1998) first documented the now well-known phenomenon of ratings momentum: credit rating downgrades tend to be followed by further downgrades, and conditional on a downgrade default risk is many times higher.

A large body of research has also shown that agency rating changes impact bond and equity prices. Hand, Holthausen, and Leftwich (1992) found that bond and equity prices reacted in an asymmetrical fashion in response to rating action information: bond and equity prices reacted to rating downgrades but not to rating upgrades. Kliger and Sarig (2000) also showed that investors react to rating changes when they are unexpected. More recently, Dichev and Piotrosky (2001) found excess negative stock returns in the year following a rating downgrade. Gonzalez, et. al. (2004) provides an excellent summary of the literature on credit rating changes and their impact on market prices.

A missing, but critical, piece of the recent literature on credit ratings is an analysis of rating outlooks. Credit rating revisions have long been the only means available to rating agencies to signal improving or deteriorating fundamental credit quality. Until relatively recently, no formal mechanism existed to communicate changes in credit quality that might ultimately be reflected in an actual rating change.

Rating agencies developed outlooks and reviews (called the Watchlist at Moody's and CreditWatch at S&P) to provide indications of the likely direction and timing of future credit rating changes. Since their introduction in the early 1990s, these rating signals have become important parts of the overall rating process. Indeed, in additional to the rating level, investors are increasingly including rating outlooks in their investment decisions, as the following excerpt illustrates:

> In the secondary market, widely held euro bonds of U.S. car giants were about five basis points wider on the day, still stinging after a weak credit rating outlook for the world's largest automaker GM. "The market just feels

> heavy. We were doing well until Moody's came out with their negative outlook on GM Monday," said a bond trader in London. (Reuters News, 15 February 2005)

Rating outlooks and reviews help mitigate the potential conflict between the two objectives of the credit rating system: stability and accuracy.[1] Rating agencies' ratings management practices seek to limit rating changes if there is a high likelihood that they might be reversed over a short period of time and to dampen rating change volatility by moving ratings in a gradual, even predictable, fashion in response to changes in credit quality.

One can interpret rating management policies as a natural reaction to a classic signal extraction problem: when an obligor's credit risk profile appears to have shifted, is the change permanent or transitory? In general, only credit quality changes that are believed to be permanent should result in a credit rating action. Rating outlooks can be viewed as an indication that a change in risk profile has been observed, but its permanence has not yet been established. When it is believed that a permanent change in risk has indeed occurred, the obligor is placed on review for a rating change. When the remaining uncertainty is resolved, the rating is either changed or confirmed.

Since, by design, rating outlooks anticipate credit rating actions, the distributions of credit rating changes and defaults at a future date conditional on rating outlooks are likely to differ significantly from the unconditional distributions for a given rating category. Hence, a complete credit opinion consists of a credit rating and rating outlook. The fact that credit rating changes are serial correlated (exhibit rating momentum) also

[1] See Fons (2002).

raises the possibility that past rating actions also need to be included in the expanded definition.

This dissertation documents the historical rating transition and default rates of corporate bond issuers conditional on past actions, rating outlooks, and rating reviews. We primarily seek to answer four questions, each addressed in its own section of this special comment. First, we ask how different are rating transition and default rates when conditioned on rating history and outlook/Watchlist status, where each is considered in isolation? Second, does rating outlook/Watchlist status fully summarize transition and default risk within each rating category? Or does rating transition and default risk still depend on rating history after conditioned on outlooks and reviews? In part three we investigate how much the predictive power of Moody's credit ratings is increased by recognizing the information contained in rating outlooks and reviews. In the final section of this study we analyze the extent to which outlook assignments affect investors' views on credit risk as reflected in market prices. Specifically, we analyze the impact of rating outlook announcements on credit default swaps (CDS) premia. Does the CDS market anticipate outlook assignments, or is the CDS market "surprised" by outlook assignments?

In the next section, we describe the data set used as the basis for our empirical results. The following section (Section 3) briefly describes Moody's policies with regard to the assignment of rating outlooks and reviews. We then proceed to address the four questions posed above, each in separate sections.

2. Rating Agency Policies on the Use of Outlooks and Reviews

Rating agencies continually monitor the credit quality of the issuers they rate and, when warranted, upgrades or downgrades an issuer's credit rating to reflect changes in its fundamental credit quality. Although ratings are the primary means by which rating agencies express their opinion of an obligor's credit quality, rating outlooks and the Watchlist are supplemental tools to communicate potential changes in corporate credit quality.[2] The assignment or changing of rating outlooks and reviews are often precursors to actual credit rating changes.

A rating outlook is an opinion regarding the likely direction of an issuer's credit quality, and therefore its rating, over the medium term, usually with an average ex-ante horizon of 18 months. Rating outlooks take the values positive, negative, stable, and developing (contingent upon an event).[3] Prior to 2002, rating outlooks were assigned by the analyst monitoring the credit in consultation with her team managing director, or by a full rating committee. As of 2003, rating outlooks are assigned and changed only after a full rating committee has convened. An issuer's current rating outlook terminates when a rating change takes place, when a rating is withdrawn, or, when it is placed on the Watchlist.

Rating reviews (the Watchlist) are a subset of rating outlooks that are much stronger statements about the future direction a credit rating may take.[4] When an

[2] In this study we focus on Moody's outlooks and Watchlist designations. The other major rating agencies use similar signals that may go by somewhat different names.

[3] Developing outlooks have historically been rarely assigned (less than 0.4% of outlooks assigned between 1995 and 2005), and as they do not clearly signal a future rating direction, we did not use them as a basis for calculating conditional default and rating transition statistics.

[4] We omit the "direction uncertain" Watchlist category in this study since they do not provide a clear signal about a credit rating's future direction. Their exclusion does not impact the results contained herein as uncertain rating reviews constitute less than 4% of all Watchlist assignments between 1995 and 2003.

obligor's credit quality is believed to have changed to the point that its rating may need to be revised upward or downward, it is placed on Moody's Watchlist as on review for possible upgrade, on review for possible downgrade, or review with direction uncertain. Unlike rating outlooks, rating reviews have always been decided by a full rating committee. Rating reviews are concluded either by changing the issuer's credit rating or confirming its existing credit rating. Following its conclusion, a new rating outlook may be assigned, or the issuer may again be placed on the Watchlist if another rating change is anticipated.[5]

[5] Keenan (1998) contains a detailed discussion on Moody's Watchlist assignment policies as well as detailed statistical characteristics of rating reviews.

3. Data Set

The data set for this study derives primarily from Moody's Default Risk Service (DRS) database. Moody's DRS database includes rating histories and default data for corporate bond and loan issuers from 1970 to the present. Out data consists of 7,431 unique corporate bond issuers rated by Moody's between January 1995 and September 2005. For each issuer, the data set includes its rating history, outlook history, and date of default or rating withdrawal. The credit ratings on which we base the results of this dissertation are Moody's notional obligor-level ratings. Although issuers may have several rated classes of debt outstanding, our analysis is conducted at the issuer level using its estimated senior unsecured rating.

Estimated senior unsecured ratings are typically based on an issuer's outstanding senior unsecured obligations or its issuer rating.[6] If an issuer does not have a senior unsecured debt rating or an issuer rating, an estimated senior unsecured rating is derived by inference from the issuer's other rated debt issues. The object of using these notional obligor-level ratings is to isolate the probability of default component of a Moody's credit rating.[7] Although the most relevant results relate to Moody's alphanumeric rating scale (Aaa, Aa1, Aa2, etc.), for simplicity, in many places we present statistical results that are aggregated to the whole letter rating level.

Moody's introduced alphanumeric modifiers for the Caa rating category in June 1997. The 1995, 1996, and 1997 cohort years' rating change calculations are made using the Caa whole letter rating, while cohorts formed after June 1997 use the Caa1, Caa2, and

[6] Hamilton (2005) describes Moody's algorithm for deriving estimated senior unsecured ratings. All references to an issuer's rating in this study refer to its estimated senior unsecured rating.
[7] Moody's ratings are opinions about expected credit loss, which is comprised of a default probability component and a default severity component. See Fons (2002).

Caa3 modified rating categories. For all cohort years, the Ca and C rating categories are grouped into one rating class: Ca-C.

Rating downgrades associated with an event of default are placed into a separate, mutually exclusive default category. Although this category is sometimes denoted by a D symbol for brevity, it is important to note that Moody's does not have a D rating in its rating scale, and that the D symbol used in this dissertation cannot be considered a category ordered "below" Ca-C. In this context, defaults and rating withdrawals are not rating transitions per se; they represent the two competing ways in which a debt issuer can leave the Moody's-rated pool.

Rating outlook and Watchlist histories are also collected at the issuer level. The rating outlooks data is derived from two sources. Historical outlooks from 1995 to November 2003 were collected manually from Moody's press releases. These data were merged with outlooks from Moody's "live" database from November 2003 to September 2005. Rating outlooks are categorized into five classes: "Watch for downgrade" (coded DNG), "negative outlook" (coded NEG), "stable outlook" (coded STA), "positive outlook" (coded POS), and "Watch for upgrade" (coded UPG).

The credit default swaps (CDS) data we use in our analysis in Section 5 comes from Markit Group, a major distributor of CDS and other asset price data. Markit Group's raw data covers over 1,800 firms. When merged with Moody's rating and outlooks data, our sample covers 1,578 firms between February 2001 and September 2005, the last cohort year of our study. Additional detail on how we processed and analyzed the CDS data is included in section 3.

Tables 1 and 2 show some descriptive detail for the set of corporate bond issuers included in our data set. Table 1 shows that 63% of the firms included in our sample are based in North America, 20% in Europe, and 10% in the Asia-Pacific region, with the remainder dispersed throughout Latin America, Africa and the Middle East. Table 2 presents the distribution of firms in the sample by industry sector. As the table shows, the data set is composed of a broad cross section of industry categories.

Tables 3 and 4 show descriptive details of the data at the issuer-cohort level. To calculate default and rating migration rates, we assembled cohorts of issuers formed at monthly intervals from January 1, 1995 to September 1, 2004. Each cohort is tracked until September 1, 2005, and each default, rating change and rating withdrawal is recorded. Because issuers can enter (by being newly rated) and exit (by defaulting or having its rating withdrawn) the study, the data set is an unbalanced panel of 266,200 issuer-cohort observations.

Stable outlooks are by far the most common outlook category on average. Table 3, which tabulates the data by whole letter rating and outlook status, shows that 58.7% of all issuers possessed stable outlooks on the cohort formation date. The riskiest tiers of speculative grade (issuers rated Caa or Ca-C) show the least stability, while issuers of the highest quality (Aaa-rated) exhibit the highest percentage of stable outlooks. Table 4 shows the distribution of outlooks by cohort year. Rating reviews constitute a relatively larger share of the sample in the earlier years of the data.

4. Outlook Duration and Resolutions

Once assigned, outlooks may be concluded by a rating change, a rating withdrawal, a default, or a change in outlook or review status with no accompanying rating change. Table 5 presents descriptive statistics for the duration of outlooks (measured in months from assignment). The data shows that there is little difference in the duration of outlook status between the investment-grade and speculative-grade rated sub-groups. The average lengths of rating reviews are very close to their ex-ante target of 90 days. The average duration of outlooks varies from about one year to 18 months. Negative outlooks exhibit the shortest average duration, lasting approximately one year, while positive outlooks last 14 to 15 months. Stable outlooks exhibit the longest average duration at 18 months. However, there is considerable variation in outlook duration, as evidenced by the fact that the standard deviations outlook durations are generally quite high relative to their means.

Investors commonly ask two closely related but distinct questions about rating outlooks and reviews. One, given that an issuer is on review or downgrade or upgrade, what is the likelihood that the review will ultimately end in an upgrade or downgrade (independent of time horizon)? Two, what fraction of the time are downgrades or upgrades preceded by corresponding rating reviews or outlook assignments? The answer to the first question is given in Table 6, although more complete analysis of the subject is provided in the next section, which reports the likelihood of rating changes conditional on outlook status over multiple investment horizons. The answer to the second question can be derived from Table 7.

Table 6 shows the frequency with which rating reviews and outlooks are concluded with a rating upgrade or downgrade, regardless of the duration of outlook status. The table shows that 60.9% of reviews for downgrade are concluded by an actual rating downgrade; 62.6% of reviews for upgrade resulted in a rating upgrade. The data also shows that, although rating reviews tend be used less frequently for speculative-grade issuers, when they are used they tend to correlate more highly with actual rating changes than for investment-grade issuers. In the next section we estimate the probability of a rating change or default conditional on outlook status on the cohort date. Those results answer the question, given outlook status what is the probability of an upgrade, downgrade or default over some time horizon? Anticipating those results, here we tabulate the distribution of outlooks just prior to a rating change (upgrade or downgrade). Table 7 shows the percentage of issuers with the given outlook conditional on a rating change having taken place.

The table shows that rating downgrades were generally preceded by a Watch for downgrade relatively more often that rating upgrades were preceded by a Watch for upgrade. We also see that rating reviews have historically been used less often in the speculative grade segment relative to speculative grade. As a matter of rating management policy, Moody's may not assign a rating review prior a rating change for speculative-grade rated issuers. The credit quality of highly leveraged issuers tends to be low from initiation, as well as relatively volatile.[8] It is thus not uncommon for a very low speculative-grade rated issuer to be downgraded or default within a relatively short period of time without first being placed on review for downgrade. For the lowest tiers of

[8] For example, the mean default rate for B-rated issuers between 1970 and 2005 is 5.6% per annum, with a standard deviation of 4.5%. See Hamilton and Varma (2005).

speculative grade, these risks are embedded in the level of the rating as well as its outlook, which has a longer forward-looking horizon.

5. Default and Rating Migration Rates Conditioned on Outlooks

Rating changes and default rates are strongly correlated with outlook status over time horizons as long as five years. Figure 1 graphs the cumulative downgrade rates by outlook status for all rated issuers in our data set. At any time horizon, the curves are also properly ordered by outlook status. The graph shows that reviews for downgrade are, naturally, associated with a high rate of downgrade from one to five years. At the one year time horizon, 73% of issuers on review for downgrade were downgraded, increasing to 100% by the fourth year. Figure 2 presents cumulative upgrade rates from one to five years. The graph shows that 74% of issuers on review for upgrade were upgraded within the first year; by year three, 100% of issuers on review for upgrade were upgraded.

For both upgrades and downgrades, outlooks are weak predictors of a rating change at short time horizons, but their predictive power increases quickly as the time horizon lengthens beyond one year. Figures 8 and 9 also show that "reversals" – i.e. a subsequent rating change that contradicts outlook/review status – becomes increasingly likely on average as the time horizon lengthens. The symmetry of these "reversals" for upgrades and downgrades at long time horizons may represent mean reversion of credit quality. However, the level of the effect is also an artifact of the data: it is relatively uncommon for a rating to change in a direction opposite its outlook, so the denominator of the upgrade/downgrade rate is relatively small (especially net of rating withdrawals).

More detail on the impact of outlook status on rating migration behavior can be seen from the full rating migration matrix. Table 8 shows average one-year rating migration rates by alphanumeric rating conditional on outlook status. The matrices were constructed using monthly cohorts, and in keeping with the prevailing methodologies,

rating changes, defaults, and rating withdrawals were recorded as mutually exclusive categories. The cells in each matrix show the migration rate from the row rating to the column rating adjusted for rating withdrawals.[9]

The matrices show that, by rating category, rating changes over one year are strongly correlated with outlook status. For reviews for downgrade and negative outlooks, much of the probability mass lies above the prime diagonal; for positive outlooks, there is relatively more probability mass below the prime diagonal. Another interpretation is that outlooks generally have a low likelihood of generating Type II errors (for example, of a rating being upgraded after having been on review for downgrade).

The migration tables also show that multi-notch rating changes are more common over one year as the strength of the outlook signal increases: multi-notch rating changes are more likely for positive/negative outlooks than for stable outlooks, and are more likely for rating reviews than for positive/negative outlooks. This finding is summarized in Table 9, which shows the distribution of rating notch changes over one year conditional on outlook status.

Tables 10 and 11 show average cumulative default rates by outlook status for all issuers in our data set. Reviews for downgrade and negative outlooks are associated with higher default rates relative to stable and positive outlooks over time horizons as long as five years. One obvious feature of the data shown in Tables 10 and 11 is that issuers with negative outlooks have experienced higher cumulative default rates than issuers on review for downgrade.

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[9] The migration rate for each cell in the matrix is calculated: $m_{ij} = \left(\frac{c_{ij}}{n_i}\right)\left(\frac{1}{1-w_i}\right)$, where c_{ij} is the number of issuers that migrated from rating i to rating j, n_i is the number of issuers in rating i at the start period, and w_i is the rate of rating withdrawals for rating category i.

As discussed in the previous section, however, it is not uncommon for Moody's to change the ratings of speculative-grade rated issuers without first placing them on the Watchlist. Table 3 showed that the majority of issuers rated Caa and below – the issuers most likely to default – possessed negative outlooks, but only a fraction were actually placed on review for downgrade. This result confirms the validity of Moody's policy position that a fully defined credit opinion consists of a rating together with the outlook.

Tables 10 and 11 contain detailed average cumulative default rates from one to five years conditional on outlook status by whole letter and alphanumeric ratings, respectively. At the bottom of each table are the average cumulative default rates for investment grade (IG), speculative grade (SG), and all rated issuers. For a given rating category and time horizon, default rates increase from positive outlooks to negative outlooks. Additionally, for a given outlook and time horizon, default rates increase down the rating scale. By construction, cumulative default rates are non-decreasing with the time horizon.

6. Do Outlooks Enhance Rating Accuracy?

Given that rating outlooks contribute forward-looking information on default risk apart from that contained in a credit rating alone, we test the capacity of outlooks to improve rating accuracy. Rather than taking an econometric approach, the methodology we adopt is to measure the impact of rating adjustments on the accuracy ratio (AR).[10] The accuracy ratio scores a rating system's ability to sort "goods" (non-defaults) into higher percentiles of the rating scale and "bads" (defaults) into the lowest percentiles of the rating scale. The AR ranges between 0 and 1; the higher the score, the more accurate the rating system. Cantor and Mann (2003) is a good introduction to the construction, use, and interpretation of accuracy ratios applied to credit ratings.

The adjustment procedure consists of a grid search over rating notch adjustments for outlook status and rating history that maximizes the AR. For example, one point on the grid would be to adjust ratings up by one notch (e.g. from Baa2 to Baa1) for positive outlooks and down one notch (e.g. from Ba1 to Ba2) for negative outlooks, and one notch down if the issuer was recently downgraded. We considered six different categories of adjustments to be applied to one-year, three-year, and five-year measurement horizons.

First, we established a benchmark by calculating the unconditional AR (i.e. unadjusted ratings) scores for each time horizon. We then considered: (1) the effect of adjusting for rating path only (upgraded or downgraded in the past 12 months); (2) the effect of adjusting for outlook only; (3) an unconstrained grid search over all notch adjustments for outlook status and rating path adjustments; (4) a grid search over

[10] The accuracy ratio is the area under the cumulative accuracy profile (CAP) curve above the 45-degree line. See Cantor and Mann (2003).

symmetric outlook adjustments; (5) a grid search over symmetric outlook and symmetric rating path adjustments.

Table 12 presents the optimal rating notch adjustments for each of the six adjustment schemes. The table shows optimal AR scores for pooled cohorts (treating each cohort as an independent observation and maximizing over the entire sample) as well as the mean of the optimal scores for each horizon for each monthly cohort calculated separately. The results in Table 12 show that the optimal adjustments for outlooks are somewhat more aggressive at a one-year horizon. The asymmetric adjustment schemes also generally recommend greater notching for positive conditions than for negative conditions.

The adjustments indicated by the unconstrained adjustment schemes are optimal ex-post. These results are relevant for a researcher interested only in knowing the adjustments for outlooks (and rating history) that would have optimized historical rating performance. It is unclear whether the asymmetric adjustments – particularly the aggressive notching indicated for the one-year horizon – would remain optimal over future realizations of the data.

A portfolio or risk manager interested in forward-looking rules that might enhance his future performance is interested in the answer to the following question: what reasonable adjustment scheme might investors use to enhance forward-looking portfolio management decisions? Many different schemes produce to very similar accuracy ratios. The adjustment scheme of two notches for rating reviews and one notch for outlooks comes close to maximizing the accuracy ratios across all measurement

horizons.[11] Moreover, this scheme has other advantages that recommend it: it treats negative and positive outlooks symmetrically; it adjusts more for rating reviews than outlooks; and, it depends only on current rating information (not rating history).[12]

[11] Although not shown in Table 12, a two notch adjustment for reviews and one notch adjustment for outlooks at the one year horizon generates AR scores of 0.839 for pooled cohorts and 0.826 for the mean of the monthly cohorts. Altman and Rijken (2005) independently derived similar adjustments for outlooks that maximize the accuracy ratio.

[12] Knowledge of a firm's current outlook status is a better indicator of its conditional probability of default than its rating history: despite the presence of rating momentum, adjusting ratings for past rating changes leads to negligible improvements in rating accuracy. Indeed, at the five year measurement horizon adjusting for past rating changes in addition to outlook status can lead to somewhat worse performance.

7. CDS Market Reactions to Outlook Assignments

Credit default swaps (CDS) are contracts that provide insurance against a default by a particular corporate or sovereign bond issuer (the reference entity). A CDS buyer pays a periodic premium (the spread) to the CDS seller in return for the right to sell the bond at par in the event of default. Credit default swaps help mitigate exposure to an issuer by transferring risk from the CDS buyer to the seller without requiring the exchange of the underlying bond(s).

The spread paid to the CDS seller is positively correlated with the credit risk of the reference entity: the higher the risk of default, the higher the required premium. Changes in the quoted spread for a particular issuer reveal the CDS market's opinion on its likelihood of default. Credit ratings and CDS spreads are, therefore, two – possibly different – opinions of the credit risk of a given entity.

In this section we examine the effect of rating outlooks on the relationship between credit default swap (CDS) spreads and credit ratings. Issuers on negative outlook or review for downgrade usually trade at a wider spread than other, similarly rated issuers. When rating outlooks are taken into account, the correlation between ratings and credit spreads turns out to be stronger than traditionally measured. We also examine changes in spreads around the dates on which outlook assignments or rating changes occur. While the way Moody's manages its rating system implies that many rating changes are fully anticipated in market pricing before they actually occur, we attempt to identify outlook changes that "surprise" the market and examine the subsequent impact on spreads.

In order to compare the CDS spread and Moody's ratings data, we index CDS spreads by mapping them into rating equivalents on Moody's alphanumeric 21-category scale. The mapped CDS ratings take a value in the [1,21] interval, and may be fractional. Briefly, the mapping process involves determining which five-year CDS spreads best represent each rating category on a given day and then using these representative premiums to create cutoffs between rating categories. Readers may refer to Cantor, et. al. (2005), for a detailed description of the CDS spread rating mapping process.[13] Table 13 shows Moody's alphanumeric ratings and their numerical equivalents.

Table 14 shows how the mean and median number of rating notch gaps between the Moody's rating and the CDS-implied rating vary by rating outlook. Negative rating gaps indicate that Moody's rating for an issuer is higher than the rating implied by the CDS market. As the table shows, the magnitude of average rating gaps is about one notch for positive/negative outlooks and two notches for rating reviews. Although the average gaps generally corroborate the findings of the previous section, the impact of negative reviews and outlook on CDS spreads is slightly less than would be expected from our analysis of the optimal rating adjustments.

Because the CDS spread for an issuer incorporates information embedded in both its Moody's rating and its outlook assignment, adjustments for outlook status are necessary in order to measure the true correlation between the level of Moody's ratings and CDS-implied ratings. Figure 3 demonstrates that the correlation between Moody's ratings and CDS-implied ratings is stronger when the sample is limited to issuers with stable outlooks compared to the full sample. Moreover, if one adjusts ratings as proposed

[13] The CDS-implied ratings we use in this section of the paper are available through Moody's Market Implied Ratings (MIR) service.

earlier – two notches for rating reviews and one notch for outlooks – the correlation in the full sample begins to approach that of the sample with only stable outlooks.

Figure 4 shows the effects of outlook announcements on CDS-implied and Moody's ratings in the 90 days around the announcement date.[14] The vertical axes show the average rating levels. A value of 8 maps to a Baa1 rating; 9 to a Baa2 rating. The graphs in this exhibit show that rating reviews lead to an adjustment of about one rating notch in the [-90, 90] day time interval around the announcement date. The effect of rating outlooks on CDS-implied ratings appears to be relatively weaker, affecting CDS rating levels by only about 1/5 of a notch for negative outlooks and demonstrating virtually no effect for positive outlooks.

The CDS market appears to partially anticipate rating reviews in the 90 day period before their assignment, but there is also evidence of an announcement day effect.[15] In the 90 days prior to the Watchlist assignment, the CDS-implied rating adjusts by slightly less than half a rating notch. The remaining half-notch average rating change takes place in the [0,10] day interval. The Moody's-CDS rating gap widens on average in the 90 days prior to the outlook announcement, and closes in the 90 days after the announcement.[16]

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[14] To isolate the impact of outlook announcements the CDS-Moody's ratings gap we removed issuers that experienced a rating change 90 days prior to an outlook assignment from our sample. As indicated in Figure 6 above, more than half of issuers on review for downgrade remain on review for downgrade 90 days later. An outlook assignment that follows a rating action or outlook in the same direction will be anticipated by the market. We attempt to limit our sample to firms for which the outlook announcement was a "surprise."

[15] The “announcement effect” of reviews for downgrade may reflect coincident announcements by the firms being reviewed, as rating reviews are sometimes initiated on the same day that companies issue press releases announcing important developments such as mergers or acquisitions,.

[16] These results are similar to those found by Micu, Remolona, and Wooldridge (2004) and by Hull, Predescu, and White (2004). The general conclusions of these studies are that, although they are anticipated in advance, reviews for downgrade have statistically significant effects on CDS spreads, but the effects of outlooks are weak or non-existent.

It is also interesting to analyze the strength of these conclusions based on the sign of the initial rating gap: when Moody's initially rates lower (or higher) than the CDS market, what is the effect of an outlook assignment on the size of the rating gap? Figure 5 shows the event study charts for the subset of positive initial rating gaps (Moody's rates lower than the CDS market) and Figure 6 shows negative initial rating gaps (Moody's rates higher than the CDS market). In cases where the rating gap is positive (negative), the market would presumably be "surprised" if Moody's were to initiate or assign a negative (positive) review or outlook, as this would signal that the gap would likely diverge further in the future.

For positive initial rating gaps, only reviews for downgrade lead to a significant narrowing of the gap. For negative initial rating gaps, positive outlooks and reviews for upgrade both lead to a significant narrowing of the gap. The statistical significance of outlook announcements on Moody's-CDS rating gaps is tested in Table 15. The cells of each table show the difference in the rating gap over the given time interval. The [-1, 1] time interval shows announcement day effects. Starred entries indicate that the difference is different from zero at the 5% significance level. The standard errors for the calculations were made using the bootstrap method of Efron and Tibshirani (1993). Reviews for downgrade exhibit a significant effect on rating gaps in advance of the outlook assignment, as well as a significant announcement day effect, for all subsets of the data. Negative outlooks and reviews for upgrade show significant announcement day effects for positive rating gaps. Otherwise, outlooks appear to have little to no influence on rating gaps.

8. Conclusion

Rating levels, while providing useful information on future default risk, are not sufficient statistics. Rating outlooks and reviews (the Watchlist) provide useful additional information on default risk. When conditioned on outlooks and reviews as well as rating level, average default and rating migration rates over various time horizons are readily differentiated. We also confirm the presence of the rating momentum effect: default and rating migration rates exhibit positive serial correlation with past rating actions. Importantly, however, we show that the momentum effect virtually disappears once rating outlooks and reviews are taken into account.

We also find that the performance of Moody's ratings as predictors of default is improved by adjusting for outlook status. Symmetric adjustments to ratings of two notches for rating reviews and one notch for outlooks increases the accuracy ratio from 66.2% to 71.1% at the five year time horizon. Additional adjustments for rating history do not increase rating accuracy for time horizons longer than one year.

The average gaps between Moody's ratings and those implied by CDS spreads corroborate the findings of the optimal accuracy ratio exercise: two rating notches for rating reviews and one rating notch for positive/negative outlooks, on average. Adjusting for rating outlooks in this fashion increases the correlation between Moody's ratings and CDS-implied ratings.

Event study analysis of the initiation of rating reviews and the assignment of outlooks confirms results elsewhere in the literature – that rating outlook and Watchlist changes are largely anticipated by the market, but reviews for downgrade are nonetheless associated with contemporaneous moves in credit spreads. In cases where the Watchlist

or outlook assignment was different from that which would normally be anticipated given the issuer's current CDS spreads, Moody's appears to be "ahead" of the market: an outlook assignment has a significant effect on the CDS spread implied rating and the CDS implied rating moves toward the Moody's rating.

Tables and Figures

Table 1: Distribution of issuers by geographical region

Region	Issuer Count	Share
North America	4,664	62.8%
Europe	1,511	20.3%
Asia-Pacific	719	9.7%
Latin America, Africa, Middle East	537	7.2%
Total	7,431	100.0%

Table 2: Distribution of issuers by industry sector

Industry Sector	Issuer Count	Percent
Industrial	1517	20.4%
Financial (Non-Bank)	1,266	17.0%
Banking	1,082	14.6%
Media & Technology	1,048	14.1%
Energy & Utilities	1,019	13.7%
Consumer Products	426	5.7%
Sovereign-Related	273	3.7%
Hotel, Gaming, & Leisure	259	3.5%
Transportation	242	3.3%
Retail	178	2.4%
Miscellaneous	121	1.6%
Total	7,431	100.0%

Table 3: Distribution of issuer-cohorts by rating and outlook status

Cohort Rating	DNG	NEG	STA	POS	UPG	All Outlooks	Issr-Cohorts
Aaa	4.3%	10.3%	85.5%	--	--	2.1%	5,698
Aa	9.6%	16.8%	61.7%	8.2%	3.7%	10.7%	28,398
A	8.7%	18.6%	59.6%	9.2%	3.9%	22.7%	60,319
Baa	7.6%	19.0%	59.9%	9.6%	4.0%	22.3%	59,403
Ba	8.0%	18.0%	52.8%	16.1%	5.1%	14.4%	38,276
B	4.3%	18.4%	62.2%	11.5%	3.6%	21.8%	57,956
Caa	5.8%	47.4%	38.2%	6.7%	1.9%	5.3%	14,029
Ca-C	2.4%	56.1%	34.6%	2.7%	4.1%	0.8%	2,121
Inv.Grade	8.3%	18.1%	61.0%	8.8%	3.8%	57.8%	153,818
Spec.Grade	5.7%	22.6%	55.5%	12.3%	3.9%	42.2%	112,382
All Rated	7.2%	20.0%	58.7%	10.3%	3.8%	100.0%	266,200
Issr-Cohorts	19,107	53,284	156,214	27,411	10,184	266,200	

Table 4: Distribution of issuer-cohorts by cohort year and outlook status

Cohort Year	DNG	NEG	STA	POS	UPG	Issr-Cohorts
1995	38.3%	8.5%	14.3%	6.6%	32.4%	2,426
1996	19.5%	18.0%	23.2%	21.5%	17.7%	4,964
1997	12.3%	17.8%	36.9%	22.0%	11.0%	9,171
1998	14.6%	18.3%	46.7%	13.9%	6.5%	19,077
1999	6.8%	22.3%	54.2%	11.9%	4.7%	28,617
2000	4.6%	19.3%	60.5%	11.5%	4.1%	34,638
2001	6.1%	20.3%	60.1%	10.5%	3.0%	39,112
2002	8.8%	22.9%	56.9%	9.6%	1.8%	41,375
2003	6.4%	22.5%	61.4%	7.9%	1.8%	41,139
2004	2.3%	16.0%	73.6%	6.1%	1.9%	45,681

Table 5: Outlook duration (months) descriptive statistics

Investment Grade			Speculative Grade			All Rated		
Outlook	Mean	StDev	Outlook	Mean	StDev	Outlook	Mean	StDev
DNG	2.7	2.3	DNG	2.9	2.4	DNG	2.8	2.3
NEG	12.0	12.1	NEG	13.6	12.9	NEG	12.8	12.7
STA	17.2	15.4	STA	17.8	16.0	STA	17.4	15.7
POS	15.5	14.9	POS	14.2	13.0	POS	14.5	13.6
UPG	2.9	2.5	UPG	3.8	2.7	UPG	3.3	2.6

Table 6: Frequency of rating changes concluding outlook assignments

Investment Grade			Speculative Grade			All Rated		
Outlook	Downgraded	Upgraded	Outlook	Downgraded	Upgraded	Outlook	Downgraded	Upgraded
DNG	58.8%	0.3%	DNG	66.0%	1.0%	DNG	60.9%	0.5%
NEG	12.9%	1.9%	NEG	29.9%	7.5%	NEG	20.1%	4.3%
STA	5.8%	6.4%	STA	23.7%	10.1%	STA	13.5%	8.0%
POS	3.3%	22.1%	POS	9.5%	28.8%	POS	6.7%	25.8%
UPG	0.3%	56.4%	UPG	1.1%	73.6%	UPG	0.6%	62.6%

Table 7: Distribution of outlooks prior to rating change

Investment Grade			Speculative Grade			All Rated		
Outlook	Downgraded	Upgraded	Outlook	Downgraded	Upgraded	Outlook	Downgraded	Upgraded
DNG	79.8%	0.8%	DNG	46.1%	1.5%	DNG	60.4%	1.1%
NEG	9.0%	3.0%	NEG	23.8%	11.4%	NEG	17.5%	6.6%
STA	0.8%	12.9%	STA	2.9%	20.0%	STA	2.0%	15.9%
POS	10.2%	21.7%	POS	26.8%	37.3%	POS	19.8%	28.3%
UPG	0.2%	61.5%	UPG	0.4%	29.7%	UPG	0.3%	48.0%

Figure 1: Average cumulative downgrade rates conditional on outlook status

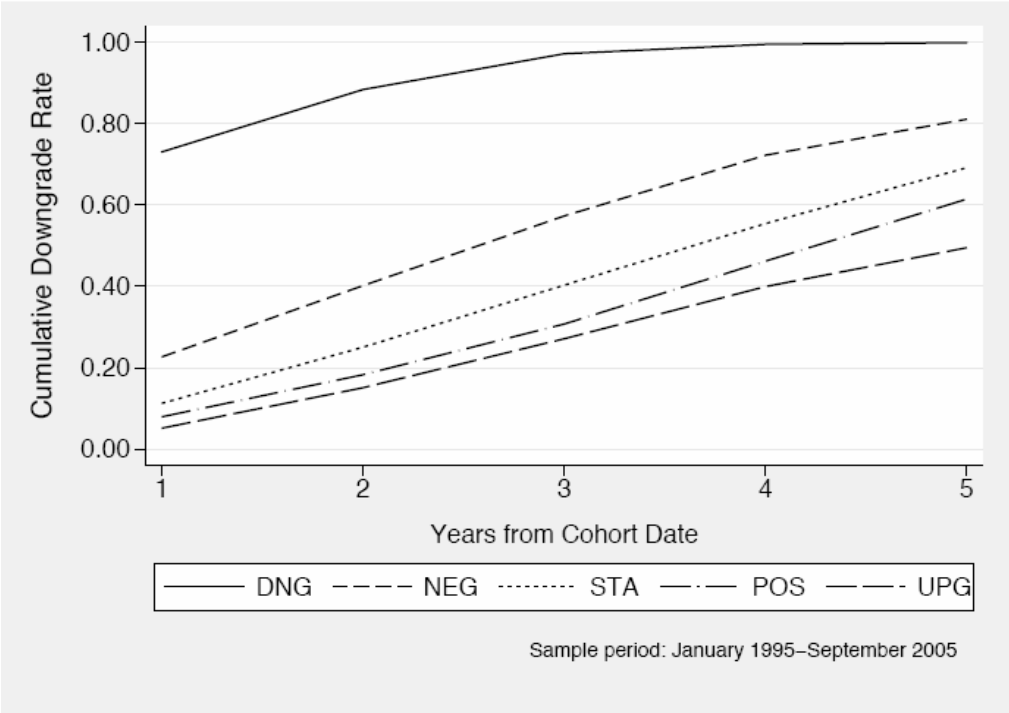

Figure 2: Average cumulative upgrade rates conditional on outlook status

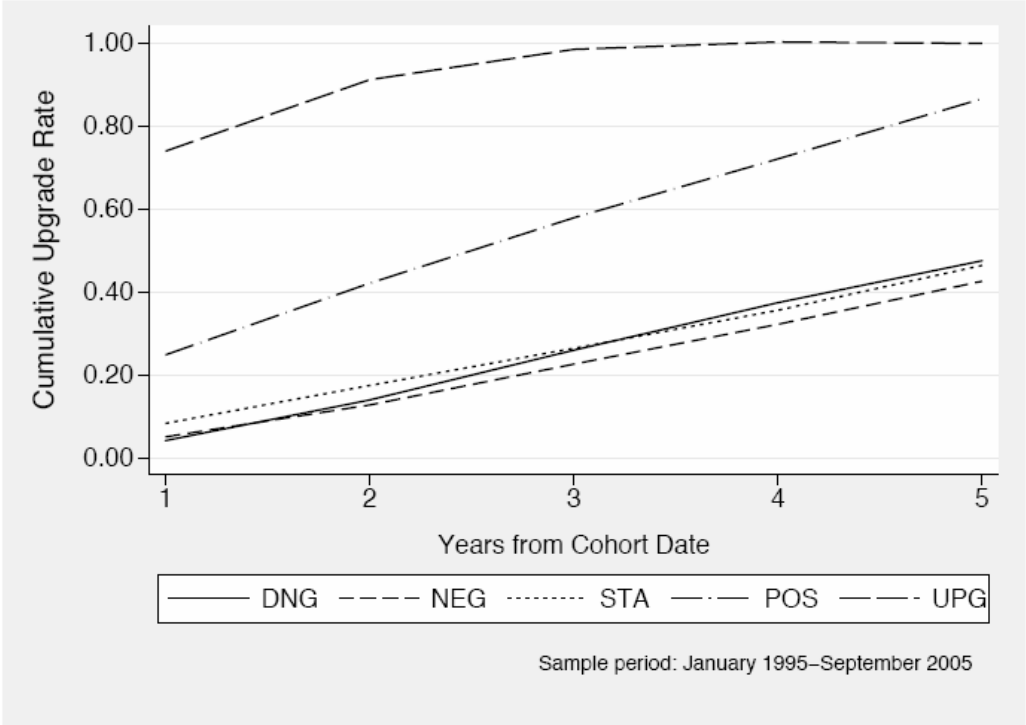

Table 12: Average one-year rating migration rates conditional on outlook status

Outlook	Cohort Rating	Issuer-Cohorts	Aaa	Aa1	Aa2	Aa3	A1	A2	A3	Baa1	Baa2	Baa3	Ba1	Ba2	Ba3	B1	B2	B3	Caa1	Caa2	Caa3	Ca-C	Default
DNG	Aaa	244	27.44	53.01	9.02	4.51	1.88	3.01	0.00	0.00	0.00	0.00	0.75	0.00	0.00	0.38	0.00	0.00	0.00	0.00	0.00	0.00	0.00
DNG	Aa1	515	0.00	19.36	42.71	29.54	4.59	0.20	0.80	2.20	0.60	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
DNG	Aa2	873	0.35	0.47	21.46	48.58	14.62	10.97	2.59	0.12	0.83	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
DNG	Aa3	1,331	0.38	0.00	0.38	24.63	49.04	19.25	2.62	2.54	0.62	0.08	0.31	0.15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
DNG	A1	1,308	0.61	0.00	0.00	0.00	21.83	49.50	17.22	3.54	5.53	0.92	0.31	0.31	0.23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
DNG	A2	2,115	0.00	0.00	0.19	0.19	0.29	30.38	40.77	15.02	4.74	3.11	2.34	0.72	1.34	0.19	0.38	0.00	0.00	0.05	0.19	0.00	0.10
DNG	A3	1,802	0.00	0.00	0.00	0.00	0.11	1.47	37.25	33.52	14.90	6.72	2.77	2.03	0.62	0.17	0.06	0.11	0.00	0.00	0.06	0.00	0.23
DNG	Baa1	1,508	0.00	0.00	0.00	0.14	0.48	0.00	3.25	28.89	36.28	17.21	4.42	3.25	2.21	2.56	0.21	0.14	0.21	0.00	0.00	0.00	0.76
DNG	Baa2	1,546	0.00	0.00	0.00	0.00	0.27	0.27	0.13	0.67	35.24	36.19	8.42	4.72	3.77	4.99	1.08	0.40	1.35	0.00	0.40	0.81	1.28
DNG	Baa3	1,450	0.00	0.00	0.00	0.00	0.00	0.35	0.00	0.49	0.56	32.13	29.87	16.17	5.93	2.90	3.18	2.40	1.55	1.27	0.42	0.64	2.12
DNG	Ba1	1,090	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.09	0.66	4.97	27.67	20.17	24.86	9.57	3.75	2.25	0.56	1.41	0.38	0.47	3.19
DNG	Ba2	836	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.62	0.25	2.62	7.11	31.80	19.83	16.33	8.98	3.49	3.87	0.87	1.25	0.37	2.62
DNG	Ba3	1,124	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.83	2.21	34.65	33.18	14.06	3.68	2.85	1.01	0.64	0.92	5.97
DNG	B1	1,041	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.19	0.00	2.23	41.74	22.36	15.40	4.82	2.69	0.83	1.30	8.44
DNG	B2	895	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.12	0.00	0.00	0.00	1.61	3.23	22.81	20.85	12.67	6.11	2.42	7.37	22.81
DNG	B3	570	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.17	0.00	0.00	0.00	1.35	1.68	6.06	26.94	12.12	15.32	2.86	5.06	28.44
DNG	Caa1	400	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.98	1.47	31.05	5.13	8.07	7.56	45.74
DNG	Caa2	278	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.46	4.58	26.76	12.68	9.82	43.70
DNG	Caa3	130	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.46	8.21	0.00	0.00	4.48	26.84	53.01
DNG	Ca-C	51	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.08	2.08	8.33	43.06	44.44

Outlook	Cohort Rating	Issuer-Cohorts	Aaa	Aa1	Aa2	Aa3	A1	A2	A3	Baa1	Baa2	Baa3	Ba1	Ba2	Ba3	B1	B2	B3	Caa1	Caa2	Caa3	Ca-C	Default
NEG	Aaa	585	79.41	8.46	5.36	1.69	4.65	0.42	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NEG	Aa1	1,111	5.96	70.19	13.46	9.03	1.36	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NEG	Aa2	895	0.00	0.00	73.77	18.58	1.97	4.70	0.00	0.00	0.98	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NEG	Aa3	2,764	0.00	1.19	0.84	79.46	13.21	4.14	0.39	0.18	0.53	0.00	0.00	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NEG	A1	2,281	0.48	0.00	0.28	4.35	71.81	14.34	6.83	0.80	0.56	0.00	0.36	0.00	0.00	0.00	0.20	0.00	0.00	0.00	0.00	0.00	0.00
NEG	A2	4,994	0.03	0.00	0.07	0.16	0.81	80.61	12.62	2.95	1.57	0.43	0.32	0.04	0.02	0.05	0.07	0.00	0.00	0.00	0.04	0.00	0.20
NEG	A3	3,967	0.00	0.00	0.00	0.00	0.11	2.65	78.25	11.12	4.01	2.41	0.82	0.02	0.28	0.00	0.00	0.17	0.04	0.00	0.00	0.11	0.00
NEG	Baa1	3,925	0.00	0.16	0.00	0.00	0.00	0.16	2.52	75.73	13.32	4.01	1.60	0.87	0.28	0.62	0.05	0.39	0.05	0.00	0.00	0.02	0.23
NEG	Baa2	3,805	0.00	0.00	0.00	0.00	0.02	0.16	1.40	1.62	75.11	11.90	3.49	1.17	2.54	1.04	0.50	0.00	0.72	0.07	0.00	0.07	0.21
NEG	Baa3	3,543	0.00	0.00	0.00	0.00	0.00	0.19	0.26	0.39	3.47	76.26	7.78	5.13	2.26	0.76	1.50	0.11	0.39	0.24	0.37	0.11	0.78
NEG	Ba1	2,030	0.00	0.00	0.00	0.00	0.12	0.09	0.00	0.00	0.99	6.11	72.44	6.96	5.13	4.28	2.16	0.33	0.00	0.61	0.42	0.09	0.26
NEG	Ba2	1,864	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.25	2.74	62.27	16.86	7.77	3.56	1.17	0.46	0.36	0.20	0.66	1.71
NEG	Ba3	3,005	0.00	0.00	0.00	0.00	0.00	0.06	0.24	0.09	0.06	0.31	1.13	3.30	71.02	14.09	4.28	2.26	1.13	0.21	0.89	0.06	0.86
NEG	B1	3,323	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.24	1.00	3.62	56.47	21.45	7.09	2.78	0.53	0.68	1.45	4.68
NEG	B2	4,011	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.83	3.09	62.65	11.82	7.73	3.06	0.83	1.58	8.41
NEG	B3	3,344	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.28	3.44	61.46	8.99	6.54	2.89	2.67	13.72
NEG	Caa1	2,994	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.81	1.49	5.62	53.98	8.44	5.20	2.97	21.50
NEG	Caa2	2,126	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.53	0.00	0.40	1.32	2.15	5.80	51.40	3.25	4.57	30.59
NEG	Caa3	1,527	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.34	0.21	3.91	6.04	56.73	2.81	29.95
NEG	Ca-C	1,190	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.68	2.12	5.69	5.78	34.51	51.22

	Cohort Rating	Issuer-Cohorts	Aaa	Aa1	Aa2	Aa3	A1	A2	A3	Baa1	Baa2	Baa3	Ba1	Ba2	Ba3	B1	B2	B3	Caa1	Caa2	Caa3	Ca-C	Default
STA	Aaa	4,869	98.02	0.62	1.30	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
STA	Aa1	3,193	2.47	85.32	5.18	6.43	0.00	0.54	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
STA	Aa2	5,350	0.16	2.09	93.70	3.55	0.20	0.26	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
STA	Aa3	8,977	0.11	0.26	3.18	91.25	3.65	1.05	0.22	0.08	0.12	0.00	0.00	0.00	0.07	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
STA	A1	10,262	0.00	0.00	0.27	4.67	87.54	5.04	1.85	0.38	0.17	0.00	0.05	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
STA	A2	12,993	0.00	0.00	0.10	0.79	3.55	87.45	5.80	1.28	0.71	0.12	0.07	0.00	0.05	0.01	0.00	0.00	0.00	0.02	0.00	0.00	0.07
STA	A3	12,678	0.06	0.06	0.05	0.18	3.90	3.55	85.37	4.22	1.65	0.27	0.17	0.15	0.10	0.03	0.09	0.00	0.00	0.00	0.02	0.00	0.11
STA	Baa1	12,259	0.00	0.03	0.06	0.00	0.12	1.90	4.24	85.85	4.67	1.62	0.35	0.15	0.08	0.59	0.08	0.00	0.00	0.00	0.00	0.00	0.27
STA	Baa2	12,955	0.09	0.04	0.00	0.10	0.18	0.32	2.24	3.30	87.21	4.62	0.75	0.37	0.17	0.17	0.11	0.02	0.14	0.00	0.02	0.01	0.12
STA	Baa3	10,353	0.01	0.00	0.00	0.08	0.05	0.24	0.32	2.87	5.17	84.26	3.35	1.22	0.89	0.39	0.32	0.19	0.15	0.02	0.02	0.07	0.37
STA	Ba1	5,795	0.00	0.00	0.00	0.24	0.04	0.01	0.69	0.46	2.77	9.77	73.12	6.79	3.27	1.27	0.42	0.66	0.06	0.01	0.05	0.01	0.35
STA	Ba2	5,530	0.00	0.00	0.00	0.00	0.00	0.11	0.11	0.17	0.45	2.32	9.37	72.85	9.55	2.63	1.07	0.51	0.11	0.09	0.08	0.00	0.59
STA	Ba3	8,872	0.00	0.00	0.00	0.03	0.04	0.21	0.00	0.24	0.27	0.47	2.82	7.93	69.38	11.33	4.29	1.34	0.48	0.11	0.04	0.00	1.02
STA	B1	13,291	0.00	0.00	0.00	0.00	0.03	0.07	0.02	0.03	0.01	0.07	0.30	2.07	5.54	67.41	15.70	2.96	2.13	0.79	0.42	0.17	2.27
STA	B2	14,404	0.00	0.00	0.00	0.00	0.00	0.00	0.15	0.14	0.06	0.20	0.22	0.22	1.16	8.04	72.45	7.80	3.32	1.37	0.45	0.40	4.03
STA	B3	8,333	0.00	0.00	0.07	0.00	0.00	0.02	0.01	0.00	0.00	0.00	0.00	0.22	0.16	1.93	9.07	70.61	6.43	3.03	1.37	1.11	5.96
STA	Caa1	3,511	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.09	0.28	0.61	3.74	9.21	66.26	5.45	4.02	2.96	7.37
STA	Caa2	1,406	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.11	0.00	0.78	0.00	0.00	0.95	5.78	10.07	56.13	4.45	5.12	16.62
STA	Caa3	449	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.68	2.02	2.10	3.57	1.05	7.14	50.72	10.92	20.79
STA	Ca-C	734	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.42	4.16	1.25	5.96	58.65	29.58

	Cohort Rating	Issuer-Cohorts	Aaa	Aa1	Aa2	Aa3	A1	A2	A3	Baa1	Baa2	Baa3	Ba1	Ba2	Ba3	B1	B2	B3	Caa1	Caa2	Caa3	Ca-C	Default
POS	Aaa	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
POS	Aa1	213	0.79	99.21	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
POS	Aa2	725	3.76	15.52	75.88	4.36	0.12	0.36	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
POS	Aa3	1,394	0.00	4.26	23.38	69.48	2.89	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
POS	A1	2,096	0.00	0.00	0.22	15.98	82.76	0.90	0.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
POS	A2	1,954	0.00	0.00	0.37	1.29	16.14	81.43	0.23	0.00	0.00	0.00	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.51	0.00	0.00	0.00
POS	A3	1,507	0.00	0.00	0.00	0.75	2.59	19.06	72.32	2.59	1.34	0.00	1.29	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.00	0.00
POS	Baa1	1,591	0.00	0.00	0.00	0.11	1.49	1.92	18.46	65.85	5.39	3.79	1.17	0.48	0.37	0.80	0.00	0.00	0.16	0.00	0.00	0.00	0.00
POS	Baa2	2,027	0.00	0.00	0.00	0.00	0.34	0.51	6.78	17.14	71.03	1.35	0.59	0.72	0.63	0.25	0.08	0.21	0.38	0.00	0.00	0.00	0.00
POS	Baa3	2,058	0.12	0.12	0.00	0.00	0.41	0.00	0.87	6.45	22.47	66.20	1.53	0.74	0.46	0.29	0.00	0.08	0.00	0.00	0.00	0.09	0.15
POS	Ba1	2,036	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.10	4.49	20.58	67.87	2.34	0.84	0.56	0.33	0.23	0.14	0.37	0.14	0.00	0.00
POS	Ba2	1,675	0.00	0.00	0.27	0.00	0.00	0.38	0.00	0.22	1.03	7.96	21.93	59.88	6.77	1.30	0.27	0.00	0.00	0.00	0.00	0.00	0.00
POS	Ba3	2,459	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.12	0.38	2.07	6.03	17.67	64.94	6.37	1.73	0.61	0.00	0.00	0.00	0.00	0.09
POS	B1	3,090	0.00	0.00	0.00	0.00	0.03	0.24	0.00	0.00	0.21	0.12	1.77	7.27	16.60	61.40	9.29	1.53	1.20	0.00	0.00	0.00	0.33
POS	B2	2,275	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.00	0.04	0.04	0.37	4.90	18.36	66.69	6.60	2.08	0.21	0.30	0.00	0.36
POS	B3	1,309	0.00	0.23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.53	0.60	0.15	2.72	5.74	21.98	54.68	6.87	3.02	0.38	1.34	1.76
POS	Caa1	582	0.00	0.00	0.00	0.00	0.00	1.15	0.00	0.00	0.00	0.00	0.38	0.19	1.15	2.10	5.15	16.50	57.25	4.01	3.82	2.67	5.64
POS	Caa2	335	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.24	2.59	0.32	23.31	22.98	40.78	2.91	3.24	0.66
POS	Caa3	27	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.88	42.07	5.88	23.53	0.00	22.64
POS	Ca-C	58	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.38	14.89	25.98	48.94	3.81

	Cohort Rating	Issuer-Cohorts	Aaa	Aa1	Aa2	Aa3	A1	A2	A3	Baa1	Baa2	Baa3	Ba1	Ba2	Ba3	B1	B2	B3	Caa1	Caa2	Caa3	Ca-C	Default
UPG	Aaa	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
UPG	Aa1	101	45.92	54.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UPG	Aa2	353	9.15	54.27	35.06	0.61	0.91	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UPG	Aa3	603	2.79	14.98	57.14	23.87	1.22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UPG	A1	781	1.60	2.66	8.24	61.30	25.53	0.00	0.13	0.13	0.00	0.00	0.00	0.00	0.00	0.00	0.40	0.00	0.00	0.00	0.00	0.00	0.00
UPG	A2	870	0.94	0.59	6.60	8.73	59.67	21.82	0.00	0.00	0.83	0.00	0.00	0.00	0.00	0.00	0.83	0.00	0.00	0.00	0.00	0.00	0.00
UPG	A3	711	2.22	1.17	1.96	4.05	20.89	43.73	23.63	2.35	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UPG	Baa1	608	0.77	0.00	3.25	1.55	7.59	17.18	46.75	21.67	0.15	1.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UPG	Baa2	1,040	1.23	1.33	0.00	2.09	2.47	7.03	32.86	28.30	23.84	0.85	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UPG	Baa3	735	1.09	0.00	0.68	0.68	2.60	5.05	10.79	19.40	40.30	18.03	0.00	0.00	0.96	0.41	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UPG	Ba1	802	0.00	0.00	0.00	0.00	2.81	3.23	3.93	9.82	20.06	43.20	14.31	0.42	0.28	0.56	0.28	0.56	0.00	0.14	0.00	0.42	0.00
UPG	Ba2	576	0.00	0.00	1.54	1.10	1.32	1.32	0.00	2.20	12.75	24.40	32.97	20.44	0.88	0.44	0.66	0.00	0.00	0.00	0.00	0.00	0.00
UPG	Ba3	582	0.00	0.00	0.00	0.00	0.81	0.00	7.09	2.23	9.51	6.07	30.77	25.30	13.97	2.23	1.21	0.81	0.00	0.00	0.00	0.00	0.00
UPG	B1	972	0.00	0.42	0.00	0.56	0.70	1.69	0.42	1.26	1.83	1.97	5.06	24.86	27.08	25.14	4.35	2.25	1.69	0.00	0.00	0.00	0.73
UPG	B2	666	0.00	0.00	0.00	0.00	0.00	0.65	4.36	7.19	3.92	0.65	10.24	4.58	12.20	31.37	19.61	1.14	0.22	0.44	0.22	0.44	2.78
UPG	B3	432	0.00	0.00	4.06	0.00	1.45	2.90	4.64	0.58	2.03	5.80	0.00	2.90	0.58	17.97	36.52	14.78	4.06	0.87	0.00	0.87	0.00
UPG	Caa1	130	0.00	0.00	0.00	0.00	0.00	4.51	0.00	0.00	0.00	0.00	0.00	6.77	2.26	5.26	18.12	41.35	9.02	3.76	2.26	1.50	5.19
UPG	Caa2	82	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.84	0.00	0.00	23.53	5.88	3.13	7.84	27.45	5.88	1.96	1.96	14.52
UPG	Caa3	52	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	11.08	1.92	38.46	5.77	25.00	5.77	0.00	12.00
UPG	Ca-C	88	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	15.91	9.09	0.00	22.73	6.82	40.91	0.00	4.55	0.00

Table 9: Distribution of average rating notch changes over a one year period by outlook status

	Rating notches Up					Rating notches Down			
Outlook	>3	3	2	1	0	1	2	3	>3
					Unconditional Results				
DNG	0.2%	0.2%	0.5%	2.0%	31.2%	35.2%	16.7%	6.3%	7.7%
NEG	0.1%	0.2%	1.0%	3.3%	70.9%	13.0%	5.9%	3.5%	2.1%
STA	0.3%	0.3%	1.8%	5.4%	81.6%	6.6%	2.3%	1.0%	0.7%
POS	0.5%	1.1%	5.0%	18.7%	68.1%	4.2%	2.3%	0.6%	0.5%
UPG	9.4%	6.2%	19.2%	41.1%	21.4%	1.3%	0.6%	0.6%	0.3%
					Conditional on a Rating Change				
DNG	0.3%	0.3%	0.7%	2.9%		51.2%	24.3%	9.2%	11.2%
NEG	0.3%	0.7%	3.4%	11.3%		44.7%	20.3%	12.0%	7.2%
STA	1.6%	1.6%	9.8%	29.3%		35.9%	12.5%	5.4%	3.8%
POS	1.5%	3.3%	15.2%	56.8%		12.8%	7.0%	1.8%	1.5%
UPG	12.0%	7.9%	24.4%	52.3%		1.7%	0.8%	0.8%	0.4%

Table 10: Whole letter rating cumulative default rates by outlook status

Outlook	Rating	Issuer-Cohorts	Year 1	Year 2	Year 3	Year 4	Year 5
DNG	Aaa	244	0.00	0.00	0.00	0.00	0.00
DNG	Aa	2,719	0.00	0.00	0.00	0.00	0.00
DNG	A	5,225	0.12	0.12	0.22	0.22	0.46
DNG	Baa	4,504	1.38	1.94	3.57	5.26	5.90
DNG	Ba	3,050	4.06	6.91	10.55	15.12	17.96
DNG	B	2,506	18.11	27.63	34.67	43.28	48.49
DNG	Caa	808	46.19	55.98	61.97	64.79	72.33
DNG	Ca-C	51	44.44	58.05	74.18	74.18	100.00
DNG	IG	12,692	0.54	0.73	1.32	1.85	2.14
DNG	SG	6,415	15.18	21.46	26.59	32.08	35.78
DNG	All	19,107	5.45	7.62	9.56	11.42	12.53

Outlook	Rating	Issuer-Cohorts	Year 1	Year 2	Year 3	Year 4	Year 5
NEG	Aaa	585	0.00	0.00	0.00	0.00	0.00
NEG	Aa	4,770	0.00	0.00	0.00	0.00	0.00
NEG	A	11,242	0.09	0.46	0.82	1.05	1.52
NEG	Baa	11,273	0.40	0.73	0.99	1.34	2.12
NEG	Ba	6,899	0.91	2.99	6.08	10.27	12.74
NEG	B	10,678	8.89	16.96	23.70	28.92	32.78
NEG	Caa	6,647	26.33	39.56	46.56	51.75	56.66
NEG	Ca-C	1,190	51.22	61.90	66.87	66.87	66.87
NEG	IG	27,870	0.20	0.48	0.72	0.95	1.43
NEG	SG	25,414	13.18	20.88	26.40	30.95	34.17
NEG	All	53,284	6.32	10.03	12.63	14.69	16.27

Outlook	Rating	Issuer-Cohorts	Year 1	Year 2	Year 3	Year 4	Year 5
STA	Aaa	4,869	0.00	0.00	0.00	0.00	0.00
STA	Aa	17,520	0.00	0.00	0.00	0.00	0.00
STA	A	35,933	0.07	0.23	0.44	0.62	0.81
STA	Baa	35,567	0.25	0.71	1.24	1.90	2.18
STA	Ba	20,197	0.71	2.42	4.64	6.20	7.67
STA	B	36,028	3.82	10.87	17.86	23.22	27.89
STA	Caa	5,366	10.90	25.43	38.59	48.27	56.72
STA	Ca-C	734	29.58	48.17	58.60	60.81	60.81
STA	IG	93,889	0.12	0.36	0.66	1.00	1.19
STA	SG	62,325	3.69	9.68	15.53	19.85	23.57
STA	All	156,214	1.53	4.09	6.73	8.81	10.64

Outlook	Rating	Issuer-Cohorts	Year 1	Year 2	Year 3	Year 4	Year 5
POS	Aaa	NA	NA	NA	NA	NA	NA
POS	Aa	2,332	0.00	0.00	0.00	0.00	0.00
POS	A	5,557	0.00	0.04	0.34	0.56	0.56
POS	Baa	5,676	0.05	0.53	0.58	0.82	1.47
POS	Ba	6,170	0.03	0.21	0.73	1.69	2.52
POS	B	6,674	0.62	3.00	5.52	8.38	12.89
POS	Caa	944	4.42	12.72	23.67	39.56	51.32
POS	Ca-C	58	3.81	3.81	3.81	20.99	73.66
POS	IG	13,565	0.02	0.24	0.38	0.57	0.83
POS	SG	13,846	0.62	2.36	4.40	7.04	10.32
POS	All	27,411	0.32	1.28	2.35	3.73	5.49

Outlook	Rating	Issuer-Cohorts	Year 1	Year 2	Year 3	Year 4	Year 5
UPG	Aaa	NA	NA	NA	NA	NA	NA
UPG	Aa	1,057	0.00	0.00	0.00	0.00	0.00
UPG	A	2,362	0.00	0.00	0.00	0.00	0.14
UPG	Baa	2,383	0.00	0.05	0.05	0.19	1.33
UPG	Ba	1,960	0.00	0.67	2.04	3.02	4.42
UPG	B	2,070	1.21	3.82	6.98	11.14	15.55
UPG	Caa	264	9.23	21.00	33.22	45.24	45.24
UPG	Ca-C	88	0.00	0.00	20.34	20.34	60.17
UPG	IG	5,802	0.00	0.02	0.02	0.07	0.56
UPG	SG	4,382	1.11	3.28	6.24	9.02	12.23
UPG	All	10,184	0.45	1.23	2.22	3.13	4.40

Table 11: Alphanumeric rating cumulative default rates by outlook status

Outlook	Rating	Issuer-Cohorts	Year 1	Year 2	Year 3	Year 4	Year 5
DNG	Aaa	244	0.00	0.00	0.00	0.00	0.00
DNG	Aa1	515	0.00	0.00	0.00	0.00	0.00
DNG	Aa2	873	0.00	0.00	0.00	0.00	0.00
DNG	Aa3	1,331	0.00	0.00	0.00	0.00	0.00
DNG	A1	1,308	0.00	0.00	0.00	0.00	0.00
DNG	A2	2,115	0.10	0.10	0.16	0.16	0.58
DNG	A3	1,802	0.23	0.23	0.44	0.44	0.66
DNG	Baa1	1,508	0.76	0.76	1.32	2.90	2.90
DNG	Baa2	1,546	1.28	2.08	4.28	5.27	6.84
DNG	Baa3	1,450	2.12	2.99	5.13	7.74	8.11
DNG	Ba1	1,090	3.19	6.62	7.30	7.30	7.30
DNG	Ba2	836	2.62	4.30	7.95	10.99	16.07
DNG	Ba3	1,124	5.97	9.10	15.45	25.25	29.09
DNG	B1	1,041	8.44	15.85	20.88	30.90	36.98
DNG	B2	895	22.80	31.77	38.48	42.23	45.96
DNG	B3	570	28.44	42.73	53.98	68.02	73.83
DNG	Caa1	400	45.74	58.05	65.81	69.83	75.86
DNG	Caa2	278	43.70	53.86	58.75	61.37	74.69
DNG	Caa3	130	53.01	53.01	56.25	56.25	56.25
DNG	Ca-C	51	44.44	58.05	74.18	74.18	100.00
DNG	IG	3,630	0.54	0.73	1.32	1.85	2.14
DNG	SG	859	15.18	21.46	26.59	32.08	35.78
DNG	All	4,489	5.45	7.62	9.56	11.42	12.53

Outlook	Rating	Issuer-Cohorts	Year 1	Year 2	Year 3	Year 4	Year 5
NEG	Aaa	585	0.00	0.00	0.00	0.00	0.00
NEG	Aa1	1,111	0.00	0.00	0.00	0.00	0.00
NEG	Aa2	895	0.00	0.00	0.00	0.00	0.00
NEG	Aa3	2,764	0.00	0.00	0.00	0.00	0.00
NEG	A1	2,281	0.00	0.00	0.00	0.00	0.57
NEG	A2	4,994	0.20	0.70	1.41	1.85	1.85
NEG	A3	3,967	0.00	0.43	0.56	0.67	1.65
NEG	Baa1	3,925	0.23	0.39	0.39	0.44	0.44
NEG	Baa2	3,805	0.21	0.21	0.82	0.82	0.82
NEG	Baa3	3,543	0.78	1.67	1.86	3.00	5.79
NEG	Ba1	2,030	0.26	1.70	2.31	3.68	3.68
NEG	Ba2	1,864	1.71	4.18	7.73	13.46	17.54
NEG	Ba3	3,005	0.86	3.12	7.58	12.78	15.97
NEG	B1	3,323	4.68	9.82	15.22	18.29	22.33
NEG	B2	4,011	8.41	16.70	23.45	30.31	33.10
NEG	B3	3,344	13.72	24.68	33.12	39.08	44.59
NEG	Caa1	2,994	21.50	35.94	42.63	49.05	56.85
NEG	Caa2	2,126	30.59	43.05	51.22	55.14	57.03
NEG	Caa3	1,527	29.95	41.80	47.84	52.19	55.11
NEG	Ca-C	1,190	51.22	61.90	66.87	66.87	66.87
NEG	IG	13,683	0.20	0.48	0.72	0.95	1.43
NEG	SG	7,837	13.18	20.88	26.40	30.95	34.17
NEG	All	21,520	6.32	10.03	12.63	14.69	16.27

Outlook	Rating	Issuer-Cohorts	Year 1	Year 2	Year 3	Year 4	Year 5
STA	Aaa	4,869	0.00	0.00	0.00	0.00	0.00
STA	Aa1	3,193	0.00	0.00	0.00	0.00	0.00
STA	Aa2	5,350	0.00	0.00	0.00	0.00	0.00
STA	Aa3	8,977	0.00	0.00	0.00	0.00	0.00
STA	A1	10,262	0.00	0.00	0.00	0.00	0.08
STA	A2	12,993	0.07	0.10	0.10	0.10	0.10
STA	A3	12,678	0.11	0.56	1.16	1.69	2.19
STA	Baa1	12,259	0.27	0.78	1.34	1.76	1.76
STA	Baa2	12,955	0.12	0.20	0.49	1.00	1.17
STA	Baa3	10,353	0.37	1.25	2.06	3.19	3.88
STA	Ba1	5,795	0.35	1.33	3.20	3.27	4.22
STA	Ba2	5,530	0.59	1.36	2.39	3.88	4.79
STA	Ba3	8,872	1.02	3.76	6.90	9.45	11.58
STA	B1	13,291	2.27	8.74	15.37	19.77	23.52
STA	B2	14,404	4.03	10.98	17.68	23.34	27.92
STA	B3	8,333	5.96	14.16	22.40	29.20	35.98
STA	Caa1	3,511	7.37	21.07	36.15	46.13	54.52
STA	Caa2	1,406	16.62	30.86	39.15	47.42	53.87
STA	Caa3	449	20.79	42.64	53.86	65.23	77.95
STA	Ca-C	734	29.58	48.17	58.60	60.81	60.81
STA	IG	44,900	0.12	0.36	0.66	1.00	1.19
STA	SG	6,100	3.69	9.68	15.53	19.85	23.57
STA	All	51,000	1.53	4.09	6.73	8.81	10.64

Outlook	Rating	Issuer-Cohorts	Year 1	Year 2	Year 3	Year 4	Year 5
POS	Aaa	NA	NA	NA	NA	NA	NA
POS	Aa1	213	0.00	0.00	0.00	0.00	0.00
POS	Aa2	725	0.00	0.00	0.00	0.00	0.00
POS	Aa3	1,394	0.00	0.00	0.00	0.00	0.00
POS	A1	2,096	0.00	0.00	0.00	0.00	0.00
POS	A2	1,954	0.00	0.12	1.00	1.66	1.66
POS	A3	1,507	0.00	0.00	0.00	0.00	0.00
POS	Baa1	1,591	0.00	0.00	0.00	0.00	0.00
POS	Baa2	2,027	0.00	0.64	0.72	0.72	0.72
POS	Baa3	2,058	0.15	0.84	0.91	1.54	3.24
POS	Ba1	2,036	0.00	0.00	0.00	0.00	0.95
POS	Ba2	1,675	0.00	0.00	0.18	1.38	1.38
POS	Ba3	2,459	0.09	0.53	1.68	3.31	4.53
POS	B1	3,090	0.33	1.91	2.68	3.78	7.62
POS	B2	2,275	0.36	2.32	4.41	7.24	11.47
POS	B3	1,309	1.76	6.92	15.13	23.43	31.10
POS	Caa1	582	5.64	18.91	31.77	48.48	50.59
POS	Caa2	335	0.66	1.50	10.91	27.27	44.06
POS	Caa3	27	22.64	22.64	22.64	0.00	0.00
POS	Ca-C	58	3.81	3.81	3.81	20.99	73.66
POS	IG	9,133	0.02	0.24	0.38	0.57	0.83
POS	SG	1,002	0.62	2.36	4.40	7.04	10.32
POS	All	10,135	0.32	1.28	2.35	3.73	5.49

Outlook	Rating	Issuer-Cohorts	Year 1	Year 2	Year 3	Year 4	Year 5
UPG	Aaa	NA	NA	NA	NA	NA	NA
UPG	Aa1	101	0.00	0.00	0.00	0.00	0.00
UPG	Aa2	353	0.00	0.00	0.00	0.00	0.00
UPG	Aa3	603	0.00	0.00	0.00	0.00	0.00
UPG	A1	781	0.00	0.00	0.00	0.00	0.00
UPG	A2	870	0.00	0.00	0.00	0.00	0.40
UPG	A3	711	0.00	0.00	0.00	0.00	0.00
UPG	Baa1	608	0.00	0.00	0.00	0.00	0.00
UPG	Baa2	1,040	0.00	0.11	0.11	0.11	2.42
UPG	Baa3	735	0.00	0.00	0.00	0.49	0.49
UPG	Ba1	802	0.00	1.07	1.29	1.29	4.71
UPG	Ba2	576	0.00	0.00	2.13	2.13	2.13
UPG	Ba3	582	0.00	0.75	2.93	6.38	6.38
UPG	B1	972	0.73	4.03	4.64	7.23	8.35
UPG	B2	666	2.78	5.56	6.65	6.65	6.65
UPG	B3	432	0.00	0.77	13.61	28.36	45.26
UPG	Caa1	130	5.19	20.70	34.34	56.64	56.64
UPG	Caa2	82	14.52	32.20	32.20	32.20	32.20
UPG	Caa3	52	12.00	12.00	30.86	30.86	30.86
UPG	Ca-C	88	0.00	0.00	20.34	20.34	60.17
UPG	IG	2,652	0.00	0.02	0.02	0.07	0.56
UPG	SG	352	1.11	3.28	6.24	9.02	12.23
UPG	All	3,004	0.45	1.23	2.22	3.13	4.40

Table 12: AR/ROC analysis: one-, three-, and five-year horizons

One Year Horizon

	# Notch Adjustments						Pooled Cohorts			Mean of Monthly Cohorts		
Category	DNG	NEG	POS	UPG	Down	Up	AUC	SE(AUC)	AR	AUC	SE(AUC)	AR
Unconditional	0	0	0	0	0	0	0.899	0.00161	0.798	0.899	0.01976	0.798
History only	0	0	0	0	0	+1	0.901	0.00162	0.803	0.903	0.02032	0.807
Outlook only	-3	-1	+3	+3	0	0	0.915	0.00146	0.830	0.920	0.02033	0.839
Unconstrained	-3	-1	+3	+3	0	+1	0.916	0.00147	0.832	0.920	0.02028	0.841
Symmetric outlook	-3	-2	+2	+3	0	0	0.914	0.00148	0.828	0.919	0.01974	0.839
Fully symmetric	-3	-2	+2	+3	-1	+1	0.915	0.00149	0.829	0.920	0.01975	0.841

Three Year Horizon

	# Notch Adjustments						Pooled Cohorts			Mean of Monthly Cohorts		
Category	DNG	NEG	POS	UPG	Down	Up	AUC	SE(AUC)	AR	AUC	SE(AUC)	AR
Unconditional	0	0	0	0	0	0	0.862	0.00140	0.725	0.851	0.01592	0.703
History only	0	0	0	0	-1	+1	0.863	0.00140	0.727	0.854	0.01589	0.708
Outlook only	-2	-1	+3	+3	0	0	0.875	0.00135	0.750	0.872	0.01434	0.744
Unconstrained	-2	-1	+3	+3	0	+1	0.876	0.00134	0.751	0.873	0.01433	0.745
Symmetric outlook	-2	-1	+1	+2	0	0	0.873	0.00137	0.746	0.869	0.01453	0.739
Fully symmetric	-2	-1	+1	+2	-1	+1	0.873	0.00137	0.746	0.870	0.01433	0.741

Five Year Horizon

	# Notch Adjustments						Pooled Cohorts			Mean of Monthly Cohorts		
Category	DNG	NEG	POS	UPG	Down	Up	AUC	SE(AUC)	AR	AUC	SE(AUC)	AR
Unconditional	0	0	0	0	0	0	0.838	0.00190	0.676	0.831	0.02327	0.662
History only	0	0	0	0	-2	0	0.839	0.00190	0.677	0.831	0.02342	0.662
Outlook only	-1	0	+2	+2	0	0	0.852	0.00184	0.704	0.853	0.02163	0.706
Unconstrained	-1	0	+2	+2	-1	0	0.853	0.00184	0.705	0.853	0.02170	0.707
Symmetric outlook	-2	-1	+1	+2	0	0	0.850	0.00185	0.700	0.855	0.02079	0.711
Fully symmetric	-2	-1	+1	+2	-1	+1	0.849	0.00186	0.699	0.856	0.02087	0.711

Table 13: Moody's ratings to numerical value map

Rating	Value	Rating	Value
Aaa	1	Ba1	11
Aa1	2	Ba2	12
Aa2	3	Ba3	13
Aa3	4	B1	14
A1	5	B2	15
A2	6	B3	16
A3	7	Caa1	17
Baa1	8	Caa2	18
Baa2	9	Caa3	19
Baa3	10	Ca	20
		C	21

Table 14: Mean and median monthly ratings-CDS rating notch gaps

Outlook	Mean	Median
DNG	-1.24	-1
NEG	-0.52	0
STA	0.16	0
POS	1.07	1
UPG	2.11	2

Figure 3: Correlation of CDS-implied ratings with stable outlook ratings, outlook-adjusted ratings, and unadjusted ratings

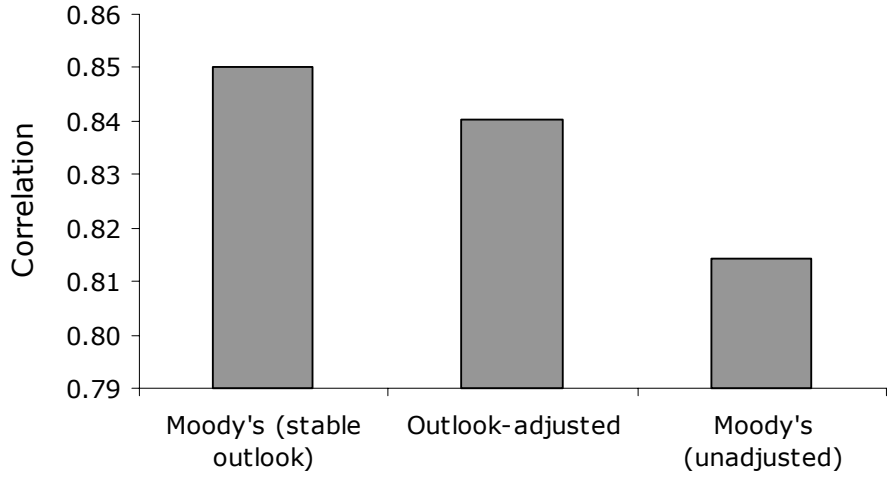

Figure 4: Event study

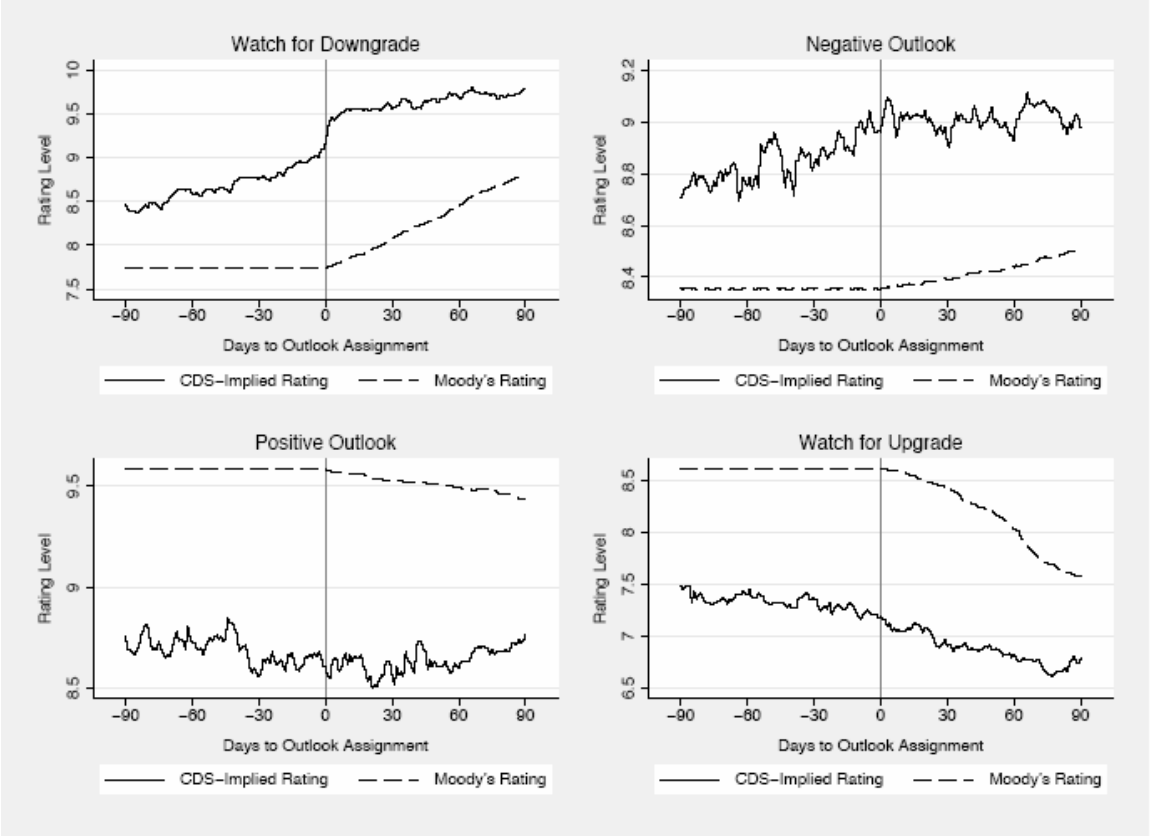

Figure 5: Event study: positive rating gaps

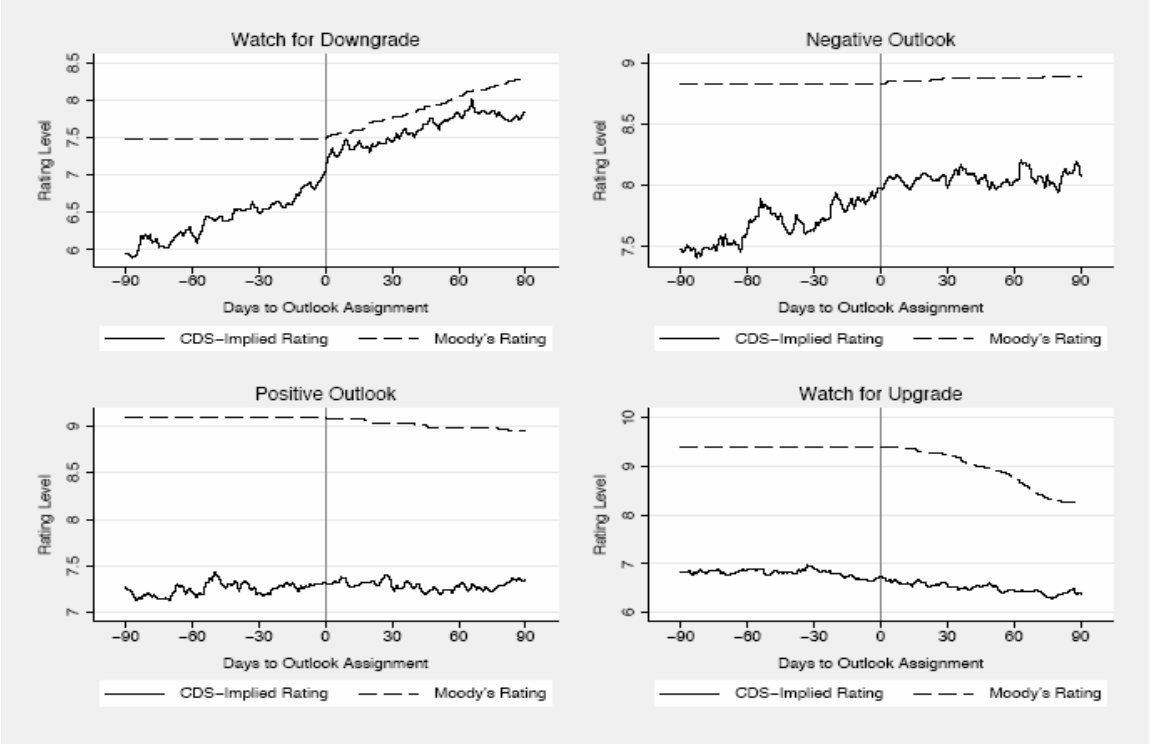

Figure 6: Event study: negative rating gaps

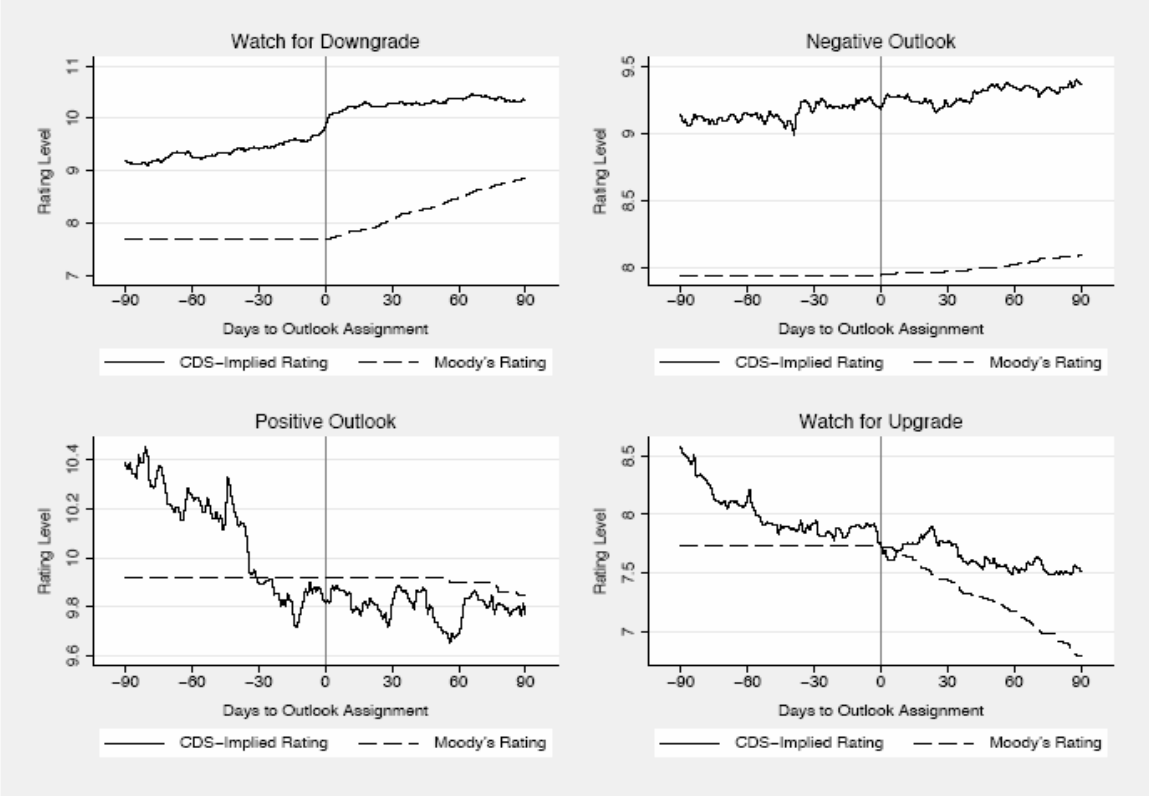

Table 15: Event study: Outlook announcement significance tests

All Data

		Days to outlook assignment				
Outlook	No. Events	[-90, -61]	[-60, -31]	[-30, -1]	[-1, 1]	[1, 30]
Watch for downgrade	458	-0.2148*	-0.208*	-0.353*	-0.182*	-0.032
Negative outlook	301	0.021	-0.075	-0.149*	-0.035	0.025
Positive outlook	163	0.068	0.104	-0.055	-0.018	0.021
Watch for upgrade	223	0.160*	0.029	0.193*	0.039	0.019

Positive Rating Gaps

		Days to outlook assignment				
Outlook	No. Events	[-90, -61]	[-60, -31]	[-30, -1]	[-1, 1]	[1, 30]
Watch for downgrade	110	-0.284*	-0.337*	-0.300*	-0.181*	0.040
Negative outlook	78	-0.033	-0.011	-0.303*	0.008	0.047
Positive outlook	91	0.025	-0.029	-0.072	0.002	-0.012
Watch for upgrade	141	0.064	-0.37	0.231*	0.002	-0.032

Negative Rating Gaps

		Days to outlook assignment				
Outlook	No. Events	[-90, -61]	[-60, -31]	[-30, -1]	[-1, 1]	[1, 30]
Watch for downgrade	348	-0.162*	-0.157*	-0.370*	-0.197*	0.051
Negative outlook	223	0.070	-0.064	-0.047	-0.013	0.004
Positive outlook	72	0.139	0.309*	0.121	0.002	0.079
Watch for upgrade	82	0.382*	0.159*	0.068	0.093	-0.24

* Significant at the 5% level.

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