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Rating Transitions and Defaults Conditional on Rating Outlooks Revisited: 1995-2005

Summary

In this special comment we revisit the topic of rating outlooks using a new, expanded data set of historical rating outlooks. We re-estimate default and rating migration rates conditional on outlook status as well as re-examine the effects of outlook status on rating accuracy. We also examine the ways in which rating outlooks alter the average relationships between CDS spreads and Moody's credit ratings. The major findings of this study include:

- Rating reviews are formal evaluations of an issuer's credit rating, enduring for about 90 days on average. Rating outlooks, which are opinions about the likely direction a credit rating may take over a longer time horizon, last between 12 and 18 months on average.
- The majority of rating changes are preceded by rating reviews, although rating reviews have historically been used more intensively for investment-grade issuers than for speculative-grade issuers, and more intensively preceding downgrades than upgrades.
- For similarly rated issuers on Watch for downgrade or with negative outlooks, downgrade and default rates for issuers are many-fold higher than issuers on Watch for upgrade or with positive outlooks.
- The accuracy of Moody's ratings as predictors of default is improved by adjusting for outlook status. Adjusting ratings by two notches for rating reviews and one notch for outlooks increases the five-year accuracy ratio from 66.2% to 71.1%. Additional adjustments for rating history do not increase rating accuracy for horizons longer than one year.
- The optimal adjustments for Watchlist/outlook status are corroborated by the gaps between Moody's ratings and those implied by CDS spreads. Rating reviews are associated with a two-notch average rating gap and outlooks are associated with an average one-notch rating gap.
- Although CDS spreads often anticipate rating, Watchlist, and outlook actions, in those instances where Moody's actions appear contrary to market opinion, we find evidence that the CDS market's estimate of credit risk adjusts toward Moody's opinion.

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Introduction

Moody's rating outlooks and reviews (the Watchlist¹) provide indications of the likely direction and timing of future credit rating changes. Rating outlooks and reviews have emerged as an important part of the rating process in the last decade. Moody's ratings have served investors' informational and portfolio governance needs for nearly a century, facilitating both financial regulation and market efficiency in the capital markets. However, because the effectiveness of many of the governance uses of ratings depend on their stability as well as their accuracy (see Cantor and Mann 2003), credit ratings are often not adjusted for potentially temporary changes in credit risk that may be reversed in the near future. Outlooks help alleviate the tension between accuracy and stability by providing timely warnings of likely rating changes that will occur if expectations are realized or current trends continue.

Indeed, investors recognize the forward-looking nature of the information contained in outlooks and 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)

Hamilton and Cantor (2004) was Moody's first study examining the information contained in rating outlooks and reviews.² That study found three empirical results. First, outlooks account for a large part of the heterogeneity of historical default and rating migration rates within a rating class. Second, the well documented phenomenon of rating momentum (i.e., downgrades followed by downgrades and upgrades followed by upgrades) is much less significant after one controls for outlook status. That is, knowing whether a firm is on review or has a negative outlook is much more important for its conditional probability of downgrade than knowing whether it was downgraded in its recent past. Lastly, the authors determined that simple, intuitive adjustments to the level of ratings for outlook status substantially increased the accuracy of the rating system.

In this report we reprise the Hamilton and Cantor (2004) study using an expanded data set of historical rating outlooks. We report a wide variety of descriptive statistics, such as the fraction of rating reviews that ended in downgrades or upgrades and the frequency with which rating changes are preceded by rating reviews. We estimate migration rates and default rates by rating category conditional on different outlook states. We again perform an analysis of the optimal rating adjustments for outlooks and reviews that increase the predictive power of the rating system (as measured by the accuracy ratio) over different investment horizons.³

An added feature of the current report is our analysis of the effect of rating outlooks on the relationship between credit default swap (CDS) spreads and credit ratings. Issuers on negative outlook or review for downgraded usually trade wider 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 previously measured. We also examine changes in spreads around the dates when 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 occur, our analysis of rating outlooks around rating changes allows us to identify rating changes that surprise the market and examine the subsequent impact on spreads.

The next section describes our data set, which includes rating changes, rating outlooks, rating reviews, defaults, and CDS spread data. Section two analyzes some characteristics of outlook dynamics, including outlook durations and migrations. In section three we present our updated estimates of conditional default and rating migration rates. We revisit the adjustments for outlooks that optimize rating accuracy in section four. Section five presents our event study analysis of the effect of rating outlooks on the relationship between Moody's ratings and CDS spreads.

1. The terms *rating review* and *Watchlist* are used interchangeably throughout this report.

2. Moody's Watchlist was previously studied in Keenan (1998).

3. One aspect of the Hamilton and Cantor (2004) study that we do not fully re-examine in this report is the issue of rating path dependency. As part of our research for the current report, we re-calculated rating migration and default rates conditional on past rating actions. Our findings, which we omit from this report, corroborate those of Hamilton and Cantor (2004). In particular, we found that the predictive power of rating history for rating migration and default largely disappears when conditioned on outlook status. However, in the section dealing with the optimal adjustments to ratings for outlook status, we do include rating history in our analysis.

Data Set

The data set for this study consists of 7,431 unique corporate issuers rated by Moody's between January 1995 and September 2005.⁴ For each issuer, the data set includes its rating history, outlook history, and, where applicable, date of default or rating withdrawal. Although issuers may have several rated classes of debt outstanding, our analysis is conducted at the issuer level. Issuer-level rating histories consist of Moody's estimated senior unsecured ratings.⁵ Similarly, rating outlook and Watchlist histories are also collected at the issuer level.

The rating history and default data come from Moody's Default Risk Service (DRS) database. 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). As in our first study, we exclude the "Watch with direction uncertain" and "developing outlook" categories. We also treat gaps in an issuer's outlook history as missing data.

The credit default swaps (CDS) data we use in our analysis in section five 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 ratings 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 five.

Exhibits 1 and 2 show some descriptive detail for the corporate issuers included in our data set. Exhibit 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. Exhibit 2 presents the distribution of firms in the sample by industry sector. As the table shows, our data sample is composed of a broad cross section of industry categories.

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%

Industry Sector	Issuer Count	% Share
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%

4. The data set used in Hamilton and Cantor (2004) included data on 5,272 unique corporate names between January 1995 and September 2003.

5. 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.

Exhibits 3 and 4 show descriptive details of the data at the issuer-cohort level. To calculate default and rating migration rates, we assemble 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 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. Exhibit 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 expected stability, while issuers of the highest quality (Aaa-rated) exhibit the highest percentage of stable outlooks. Exhibit 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.

Cohort Rating	DNG	NEG	STA	POS	UPG	All Outlooks	Issuer-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
Issuer-Cohorts	19,107	53,284	156,214	27,411	10,184	266,200	

Cohort Year	DNG	NEG	STA	POS	UPG	Issuer-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

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. Exhibit 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 of outlook durations are generally quite high relative to their means.

Exhibit 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

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 Exhibit 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 Exhibit 7.

Exhibit 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.⁶ The data also shows that, although rating reviews tend to 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.

Exhibit 6 - Frequency of Rating Changes Concluding Outlook Assignment								
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%

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). Exhibit 7 shows the percentage of issuers with the given outlook conditional on a rating change having taken place.

Exhibit 7 - Distribution of Outlooks Prior to Rating Change								
Investment Grade			Speculative Grade			All Rated		
Outlook	Downgraded	Upgraded	Outlook	Downgraded	Upgraded	Outlook	Downgraded	Upgraded
DNG	79.80%	0.80%	DNG	46.10%	1.50%	DNG	60.40%	1.10%
NEG	9.00%	3.00%	NEG	23.80%	11.40%	NEG	17.50%	6.60%
STA	10.20%	21.70%	STA	26.80%	37.30%	STA	19.80%	28.30%
POS	0.80%	12.90%	POS	2.90%	20.00%	POS	2.00%	15.90%
UPG	0.20%	61.50%	UPG	0.40%	29.70%	UPG	0.30%	48.00%

The table shows that rating downgrades were generally preceded by a Watch for downgrade relatively more often than 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. 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 speculative grade, these risks are embedded in the level of the rating as well as its outlook, which has a longer forward-looking horizon.

6. These results generally agree with the Watchlist study of Keenan (1998).

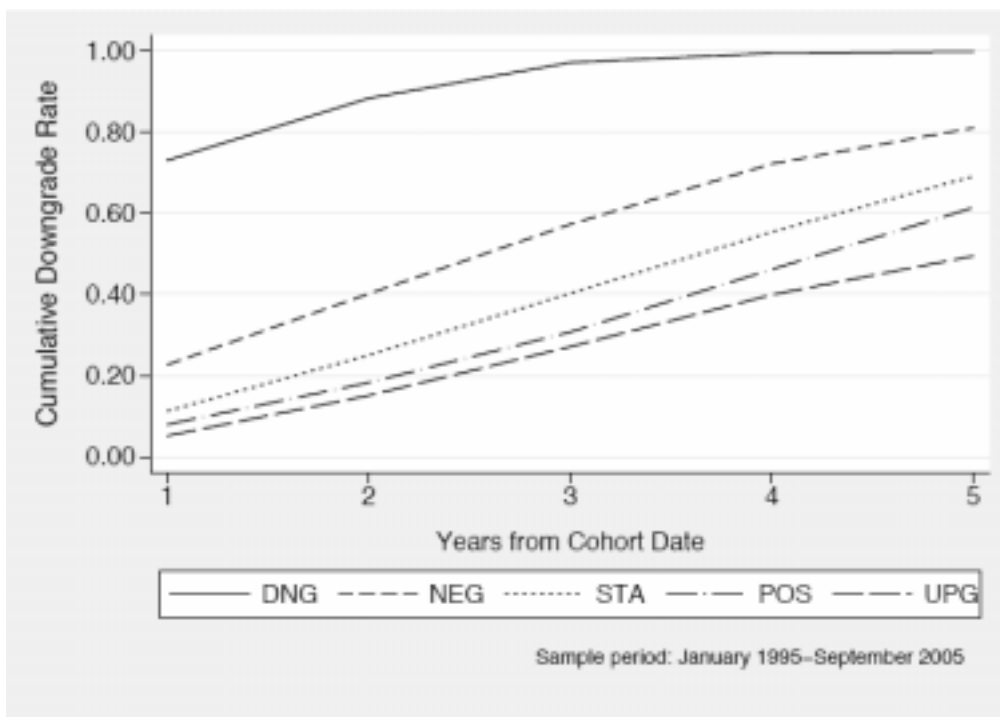
Conditional Rating Migration Rates and Default Rates

Rating changes and default rates are strongly correlated with outlook status over time horizons as long as five years. Exhibit 8 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. Exhibit 9 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. Exhibits 8 and 9 also show that "reversals" - i.e. a 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).⁷

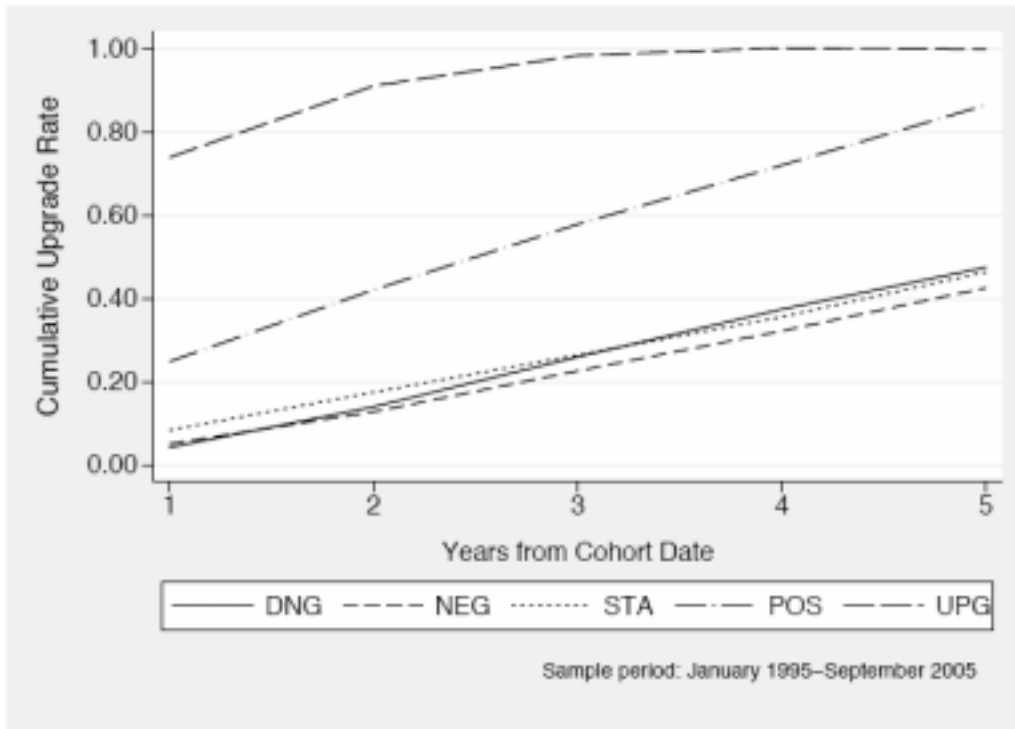
More detail on the impact of outlook status on rating migration behavior can be seen from the full rating migration matrix. Exhibit 10 shows average one-year rating migration rates by alphanumeric rating conditional on outlook status. The matrices were constructed using monthly cohorts, and, in keeping with Moody's standard practice, 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.

Exhibit 8 - Average Cumulative Downgrade Rates Conditional on Outlook Status



7. 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 number of rating withdrawals for rating category i .

Exhibit 9 - Average Cumulative Upgrade Rates Conditional on Outlook Status



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).

Exhibit 10 - Average One-Year Rating Migration Matrices 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
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	0.12	0.38	2.07	6.03	17.67	64.94	6.37	1.73	0.61	0.00	0.00	0.00	0.00	0.00	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	0.53	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	5.88	42.07	5.88	23.53	0.00	22.64	0.00
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	6.38	14.89	25.98	48.94	3.81	0.00
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
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	0.40	0.00	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

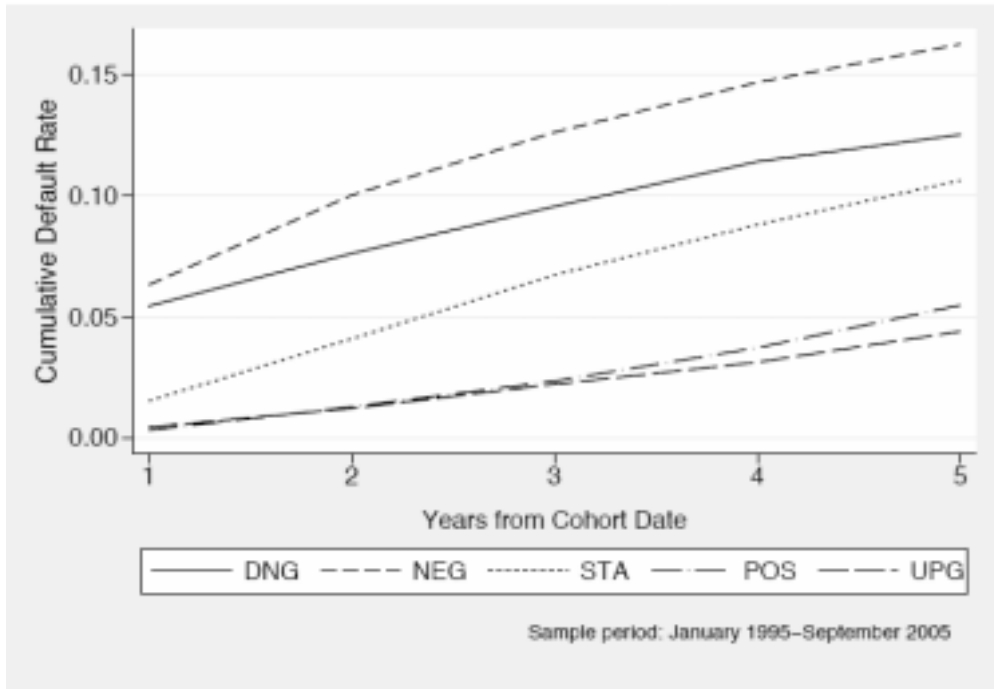
The migration tables also show that multi-notch rating changes are more common over one year as the strength of the outlook signal increases: multi-notch rating changes are more likely for positive/negative outlooks than for stable outlooks, and are more likely for rating reviews than for positive/negative outlooks. This finding is summarized in Exhibit 11, which shows the distribution of rating notch changes over one year conditional on outlook status.

Exhibit 11 - Distribution of Average Rating Notch Changes Over a One Year Period by Outlook Status									
Outlook	Rating Notches Up					Rating Notches Down			
	>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%	

Exhibit 12 shows 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 Exhibit 12 is that issuers with negative outlooks have experienced higher cumulative default rates than issuers on review for downgrade, which seems inconsistent with intuition as well as the results in Hamilton and Cantor (2004).

As we 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. Exhibit 3 above 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.

Exhibit 12 - Average Cumulative Default Rates Conditional on Outlook Status



Exhibits 13 and 14 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.

Exhibit 13 - 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

Exhibit 13 - Whole Letter Rating Cumulative Default Rates by Outlook Status							
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

Exhibit 14 - 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

Exhibit 14 - Alphanumeric Rating Cumulative Default Rates by Outlook Status							
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

Exhibit 14 - Alphanumeric Rating Cumulative Default Rates by Outlook Status							
Outlook	Rating	Issuer-Cohorts	Year 1	Year 2	Year 3	Year 4	Year 5
POS	Aaa	--	--	--	--	--	--
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	--	--	--	--	--	--
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

Optimal Rating Adjustments for Outlooks and Conditional 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. As in Hamilton and Cantor (2004) our metric is the accuracy ratio (AR).⁸ 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 outlooks 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 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 outlook and rating path adjustments; (4) a grid search over symmetric outlook adjustments; (5) a grid search over symmetric outlook and symmetric rating path adjustments.

Exhibit 15 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 monthly cohort calculated separately. The results in Exhibit 15 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.

Exhibit 15 - One-, Three-, and Five-Year Accuracy Ratios								
One Year Horizon								
Category	# Notch Adjustments						Accuracy Ratio	
	DNG	NEG	POS	UPG	Downgraded	Upgraded	Pooled Cohorts	Mean of Monthly Cohorts
Unconditional	0	0	0	0	0	0	0.798	0.798
History only	0	0	0	0	0	1	0.803	0.807
Outlook only	-3	-1	3	3	0	0	0.830	0.839
Symmetric outlook	-3	-2	2	3	0	0	0.828	0.839
Fully symmetric	-3	-2	2	3	-1	1	0.829	0.841
Unconstrained	-3	-1	3	3	0	1	0.832	0.841
Three Year Horizon								
Category	# Notch Adjustments						Accuracy Ratio	
	DNG	NEG	POS	UPG	Downgraded	Upgraded	Pooled Cohorts	Mean of Monthly Cohorts
Unconditional	0	0	0	0	0	0	0.725	0.703
History only	0	0	0	0	-1	1	0.727	0.708
Outlook only	-2	-1	3	3	0	0	0.750	0.744
Symmetric outlook	-2	-1	1	2	0	0	0.746	0.739
Fully symmetric	-2	-1	1	2	-1	1	0.746	0.741
Unconstrained	-2	-1	3	3	0	1	0.751	0.745
Five Year Horizon								
Category	# Notch Adjustments						Accuracy Ratio	
	DNG	NEG	POS	UPG	Downgraded	Upgraded	Pooled Cohorts	Mean of Monthly Cohorts
Unconditional	0	0	0	0	0	0	0.676	0.662
History only	0	0	0	0	-2	0	0.677	0.662
Outlook only	-1	0	2	2	0	0	0.704	0.706
Symmetric outlook	-2	-1	1	2	0	0	0.700	0.711
Fully symmetric	-2	-1	1	2	-1	1	0.699	0.711
Unconstrained	-1	0	2	2	-1	0	0.705	0.707

8. The accuracy ratio is the area under the cumulative accuracy profile (CAP) curve above the 45-degree line.

The adjustments indicated by the unconstrained adjustment schemes are optimal ex-post. But 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.

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 proposed in Hamilton and Cantor (2004) - two notches for rating reviews and one notch for outlooks - comes close to maximizing the accuracy ratios across all measurement horizons.⁹ 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).¹⁰

The Impact of Outlooks on the Relationship between Credit Ratings and CDS Spreads

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 the 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.¹¹ Exhibit 16 shows Moody's alphanumeric ratings and their numerical equivalents.

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

9. Although not shown in Exhibit 15, 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.

10. 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.

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

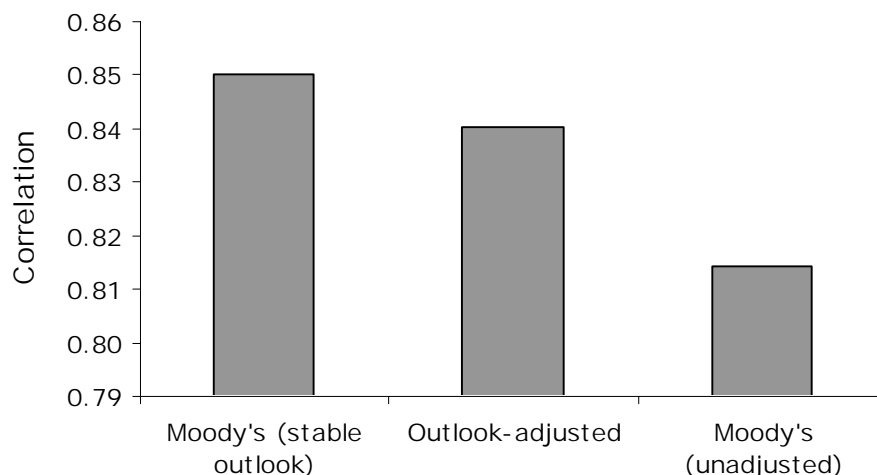
Outlooks and Gap between Moody's Ratings and CDS-Implied Ratings

Exhibit 17 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.

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

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. Exhibit 18 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 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.

Exhibit 18 - Correlation of Moody's Stable Outlook Ratings, and Outlook-Adjusted Moody's Ratings, and Unadjusted Ratings with CDS-implied Ratings

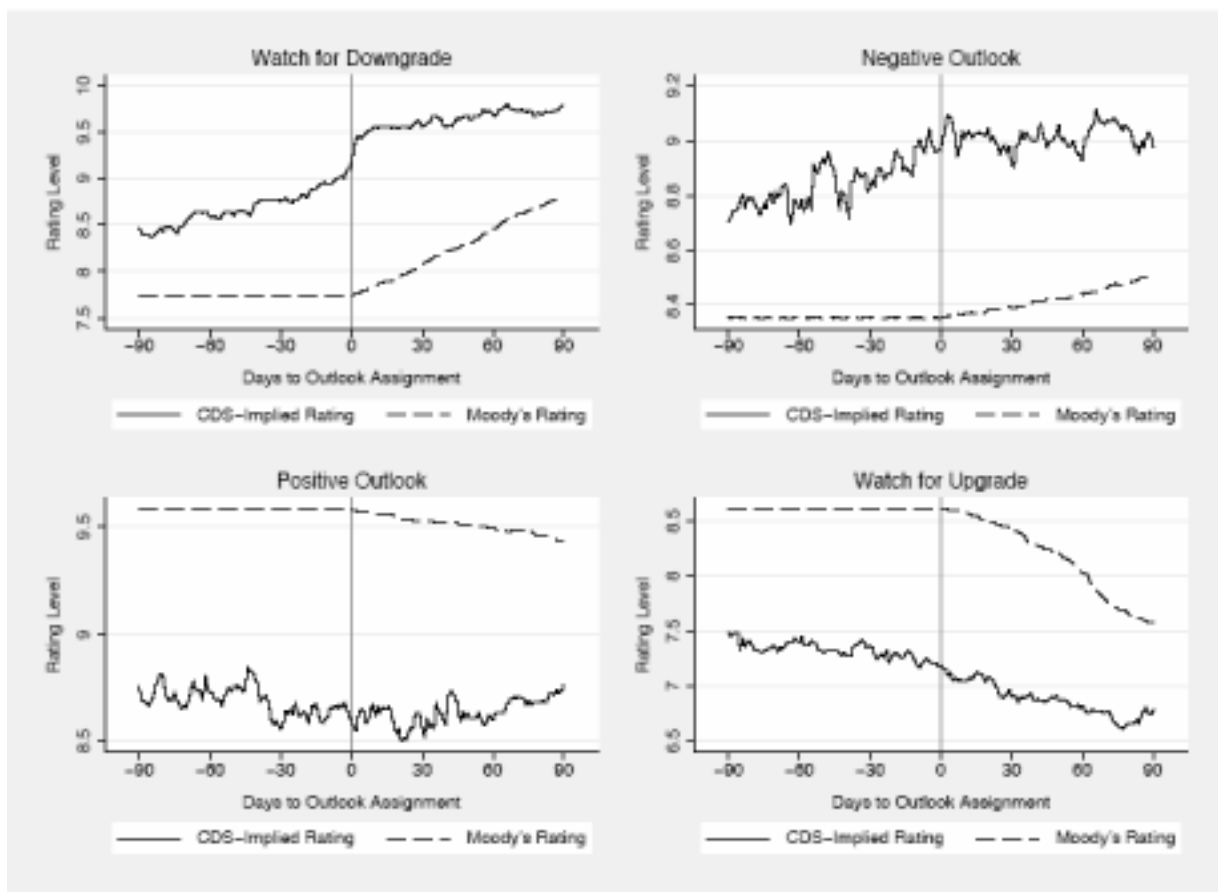


Changes in the Moody's-CDS Ratings Gap around Outlook Assignment Dates

Exhibit 19 shows the effects of outlook announcements on CDS-implied and Moody's ratings in the 90 days around the announcement date.¹² 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.¹³ 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.¹⁴

Exhibit 19 - Event Study: CDS-implied and Moody's Rating Levels



12. 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 Exhibit 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."

13. 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.

14. 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.

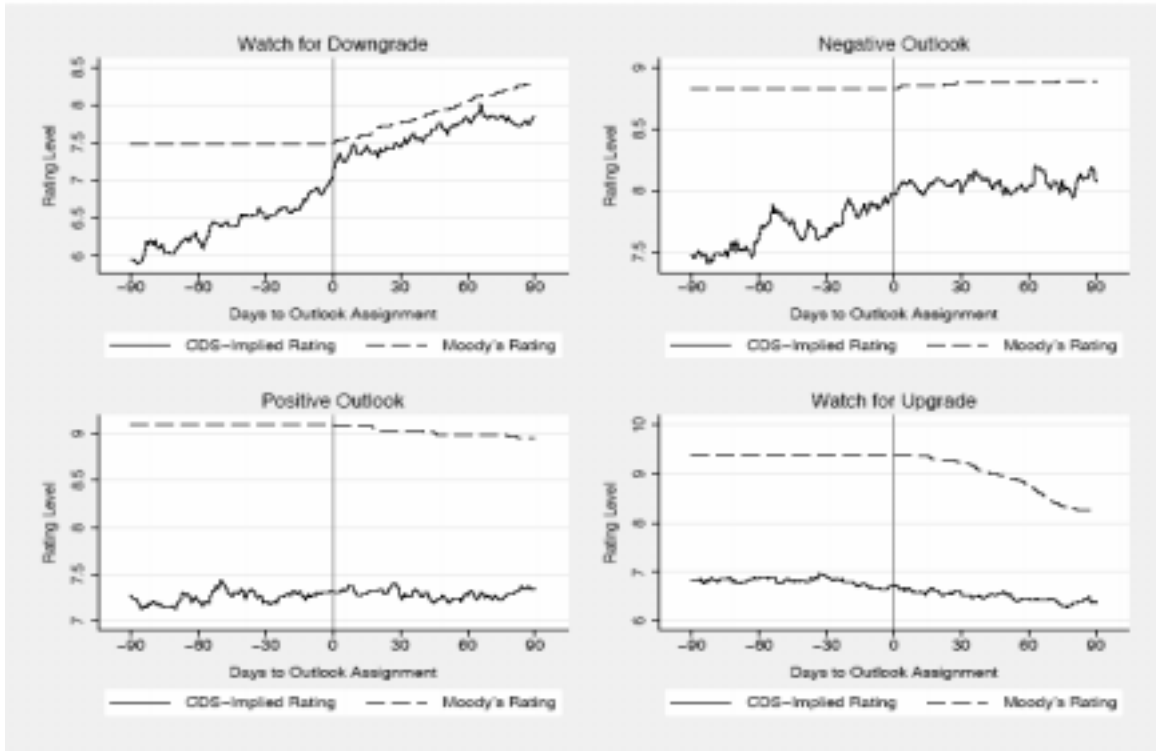
It is also interesting to analyze the strength of these conclusions based on the sign of the initial rating gap: when Moody's initially rates lower (or higher) than the CDS market, what is the effect of an outlook assignment on the size of the rating gap? Exhibit 19 shows the event study charts for the subset of positive initial rating gaps (Moody's rates lower than the CDS market) and 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.

The upper panel of Exhibit 20 shows the subset of positive initial rating gaps (Moody's rates lower than the CDS-implied rating), and the lower panel shows negative initial rating gaps (Moody's rates higher than the CDS-implied rating). 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 Exhibit 21. 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.

Exhibit 20 - Event Studies: Positive and Negative Rating Gaps

Positive Rating Gaps



Negative Rating Gaps

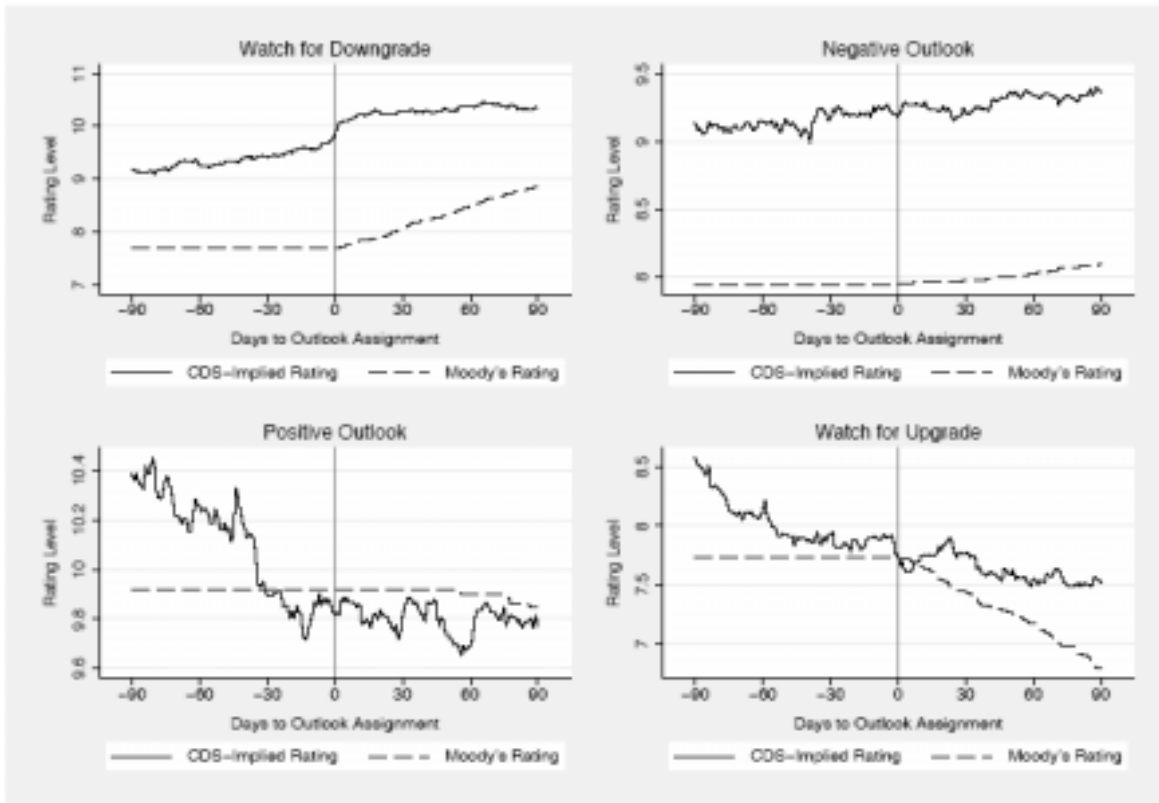


Exhibit 21 - Average Moody's-CDS Rating Gap Changes

All Data

Outlook	No. Events	Days to outlook assignment				
		[-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						
Outlook	No. Events	Days to outlook assignment				
		[-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						
Outlook	No. Events	Days to outlook assignment				
		[-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.

Conclusion

This report studied two relatively new indicators of credit risk available to investors, rating outlooks and indicative ratings implied by CDS spreads. In part this report is a follow up to Hamilton and Cantor (2004) using a new, expanded data set of historical outlooks. Our results on the strength of outlooks as predictors of rating change and default corroborate our previous study. 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.

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