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Bond Rating Confusion

Updated
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This update addresses S&P's release of CDO Evaluator™ version 3.2 on June 19. It also corrects minor errors and inconsistencies in the original version. None of the conclusions have changes.

Do not falsify measurements, whether in length, weight or volume. You must have an honest balance, honest weights, an honest dry measure, and an honest liquid measure. I am God your Lord who took you out of Egypt.

– Leviticus 19:35-36 (*trans.* A. Kaplan, *The Living Torah* (1981))

I. Summary

It's becoming less clear what bond ratings mean. Some rating agencies are adopting confusing definitions for their ratings. For example, according to S&P, a rating of "BBB" corresponds to a five-year default probability of 1.255% for asset-backed securities, but a higher default probability of 2.323% for corporate bonds. Likewise, a rating of "AA" corresponds to a seven-year default probability of 0.315% for ABS, 0.420% for corporate bonds, and 0.701% for CDOs (see Table 1 below).[1] At Moody's, municipal bond ratings correspond to half the level of expected loss[2] as corporate bond ratings for purposes of rating CDOs.[3] Inconsistent definitions make it hard for investors to use ratings to compare the credit risk in different kinds of securities.

Also, rating definitions can change over time. For example, on June 19, S&P released a new version of its CDO Evaluator™ software, including new rating definitions for ABS. As part of the software release, S&P changed the idealized default probabilities for ABS at different rating levels over different time horizons (see Table 2 below). When rating agencies change their rating definitions it becomes difficult for market participants to use ratings for comparing securities rated before the change with those rated after.

Inconsistent and changing rating definitions are particularly troubling for regulators who rely on ratings. In the context of risk-based capital regulations for banks, regulators presume that ratings from any given rating agency have consistent meanings. Inconsistent or variable rating definitions cast doubt on whether the presumption is reasonable.

[1] Standard & Poor's, CDO Evaluator™ version 3.2 (19 June 2006).

[2] Moody's and S&P define their ratings somewhat differently. S&P's rating definitions emphasize probability of default as the key criterion. Moody's emphasizes expected loss in its long-term ratings but probability of default in its short-term ratings. This paper is *not* about the differences between the rating scales of the different agencies. Rather, this paper focuses on inconsistencies within each agency's rating definitions.

[3] Chen, N., S. Lioce, and L. Washburn, *Moody's Approach to Rating US Municipal Cash-Flow CDOs*, Moody's rating methodology, at 3 (26 Nov 2002).

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Table 1: Default Probabilities Used in S&P CDO Rating Criteria
(percent)

	AAA	AA+	AA	AA-	A+	A	A-	BBB+	BBB	BBB-
Three-Year										
ABS	0.008	0.014	0.042	0.053	0.061	0.088	0.118	0.340	0.488	0.881
Corporate	0.016	0.027	0.085	0.102	0.138	0.172	0.262	0.701	1.162	2.899
CDO	0.030	0.050	0.135	0.166	0.212	0.263	0.396	0.850	1.405	3.415
Five-Year										
ABS	0.043	0.066	0.144	0.185	0.216	0.269	0.389	0.745	1.255	1.890
Corporate	0.061	0.098	0.219	0.276	0.371	0.459	0.686	1.391	2.323	5.179
CDO	0.118	0.182	0.356	0.452	0.578	0.709	1.020	1.704	2.812	6.046
Seven-Year										
ABS	0.116	0.168	0.315	0.407	0.468	0.576	0.798	1.357	2.203	3.000
Corporate	0.144	0.224	0.420	0.543	0.719	0.887	1.287	2.261	3.672	7.434
CDO	0.285	0.420	0.701	0.897	1.128	1.368	1.883	2.792	4.443	8.635

Note: Within each time horizon, cells with similar values are shaded in the same color. This table is best viewed or printed in color. For a graphical presentation of the data, which does not require color, see Chart 2 on page 8.

Source: Standard & Poor's CDO Evaluator ver. 3.2

Table 2: Change in ABS Rating Definitions (Default Probabilities) in CDO Evaluator ver. 3.2 relative to CDO Evaluator ver. 3.0
(percentage point change in default probability)

Year	AAA	AA+	AA	AA-	A+	A	A-	BBB+	BBB	BBB-
1	0.000	(0.001)	(0.003)	(0.005)	(0.004)	(0.006)	(0.010)	(0.080)	(0.100)	(0.352)
2	0.000	(0.001)	(0.002)	(0.005)	(0.011)	(0.003)	(0.006)	(0.075)	(0.110)	(0.496)
3	(0.001)	(0.001)	(0.005)	(0.003)	(0.015)	(0.006)	(0.026)	(0.046)	(0.151)	(0.714)
4	0.002	0.002	0.004	0.007	(0.009)	(0.009)	(0.019)	(0.062)	(0.120)	(0.875)
5	0.010	0.012	0.024	0.033	0.012	0.017	0.012	(0.020)	(0.023)	(0.958)
6	0.020	0.025	0.047	0.063	0.035	0.045	0.042	0.032	0.060	(1.048)
7	0.037	0.045	0.084	0.108	0.072	0.088	0.090	0.114	0.183	(1.089)

Note: Positive values indicate higher default probabilities in CDOe ver. 3.2 than in ver. 3.0. For example, the entry in the bottom right cell means that the default probability for 7-year, ABS rated BBB- declined by 1.089 percentage points in CDOe ver. 3.2 compared to version 3.0 (*i.e.*, from 4.089% to 3.000%).

Source: Nomura Securities International, Standard & Poor's

II. Discussion & Analysis

The Past: Constant Meanings: A rating is a measurement of credit risk. It expresses a rating agency's opinion on the degree of credit risk present in a rated bond. Like other kinds of measurements, a rating system is most useful when it has a constant meaning, just like measures of length and mass (*e.g.*, the meter and the kilogram). In other words, a rating system is most useful when each rating symbol has a constant meaning over time, geography, currency, and type of instrument. A rating system works best when a given symbol (*e.g.*, BBB) denotes the same measure of credit risk for a German corporate bond in 1985, a U.S. municipal bond in 1995, and a Korean mortgage-backed security in 2005. Ratings become less useful when their meanings vary over time, by geography, by currency, or by type of instrument.

In the past, rating agencies actively promoted the idea that their ratings had constant meanings. For example, in 1994, a Moody's executive stated:

> From their original application to bond ratings, these same symbols are now used to rate a diverse range of instruments, from bank deposits and mortgage pass-throughs to guaranteed insurance contracts, mutual funds, and the counterparty risk of derivatives. In some cases, there are several technical differences in the rating definitions we use. It is important to recognize, however, that ***no matter what types of instruments the ratings apply to, no matter where the issuer resides,***

> ***and no matter what currency or market in which the security is issued, Moody's ratings are intended to have the same relative meanings in terms of expected credit loss.***[4]

A few years later, Moody's Standing Committee on Symbols and Definitions reaffirmed the goal of constant meanings for the ratings on its rating scale, noting the key role of ratings in risk management:

> The need for a unified rating system is also reflected in the growing importance of modern portfolio management techniques, which require consistent quantitative inputs across a wide range of financial instruments, and the increased use of specific rating thresholds in financial market regulation, which are applied uniformly without regard to the bond market sector.[5]

S&P voiced a similar position in 2001:

> Standard & Poor's approach, in both policy and practice, is intended to provide a consistent framework for risk assessment that builds reasonable ratings consistency within and across sectors and geographies.
>
> * * *
>
> Standard & Poor's now provides ratings behavior information on six different sectors of the corporate market, the three major sectors of the structured market (asset-backed, commercial mortgage-backed, and residential mortgage-backed securities), the sovereign government sector, and, most recently, the public finance market. CreditPro also can review and compare ratings performance, both by sector and geographically.[6]

Beyond the rating agencies, regulators fuel the notion that the symbols on each agency's rating scale have constant meanings. For example, the Basel II framework includes a methodology for "mapping" an agency's scale to regulatory risk-weight categories.[7] However, there is no provision in Basel II to accommodate a rating scale where the symbols denote different levels of risk for different types of instruments. The regulators seem to want rating scales to have constant meanings:

> Testing for statistically significant differences in ratings transition contributes to shed light on the "consistency" of ratings, i.e. the degree of overall credit quality comparability across sectors, regions and products implied by the ratings process.[8]

Academics, too, have emphasized the need for constant meanings over time as a necessary condition for sensible regulatory reliance on ratings. For example:

> To be meaningful, the credit rating process should provide ratings that are stable across time and consistent across issuers. Consider for example the SEC's Net Capital Rule, which requires broker-dealers to maintain a minimum amount of capital on their balance sheet. The SEC determined that securities with a higher credit rating require lower capital. Drifts in the credit rating process would imply changes in these capital requirements. Another important application is the capital charge for credit risk of assets such as loans and bonds held by commercial banks. The Basel Committee on Banking supervision (BCBS) recently instituted new rules that map each credit rating onto a capital charge. … Suppose for instance that rating agencies tighten credit standards over time. Such tightening will create distortion in capital requirements for commercial banks and broker-dealers and will also impact other market participants…[9]

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[4] Thomas J. McGuire, The Credit Rating Process a Global Perspective, Address at The Chase Manhattan Bank, International Advisory Committee (31 Oct 1994) (transcribed in CREATING EFFICIENCY IN THE TAXABLE FIXED INCOME MARKETS –THOMAS J. MCGUIRE'S LEGACY TO MOODY'S INVESTORS SERVICE, at 136) (emphasis added).

[5] Cantor, R., et al., *The Evolving Meaning of Moody's Bond Ratings*, Moody's rating methodology, at 5 (Aug 1999).

[6] Griep, C., *Risk Management Applications Put New Focus on Ratings Criteria*, S&P special report (13 Jun 2001). Somewhat surprisingly, just a few months ago S&P implicitly promoted the idea that its ratings have constant meanings across different product types by comparing the credit performance of structured securities to corporate bonds. *See* Erturk, E. and T. Gillis, *Rating Transitions 2005: Global Structured Securities Exhibit Solid Credit Behavior*, S&P special report (2 Mar 2006). *See also* Vazza, D. and D. Aurora, *Annual 2005 Global Corporate Default Study and Rating Transitions*, S&P special report, Appendix III (31 Jan 2006) (the title of Appendix III is "Default and Transition Experience of Corporates vs. Structured Finance Asset Classes").

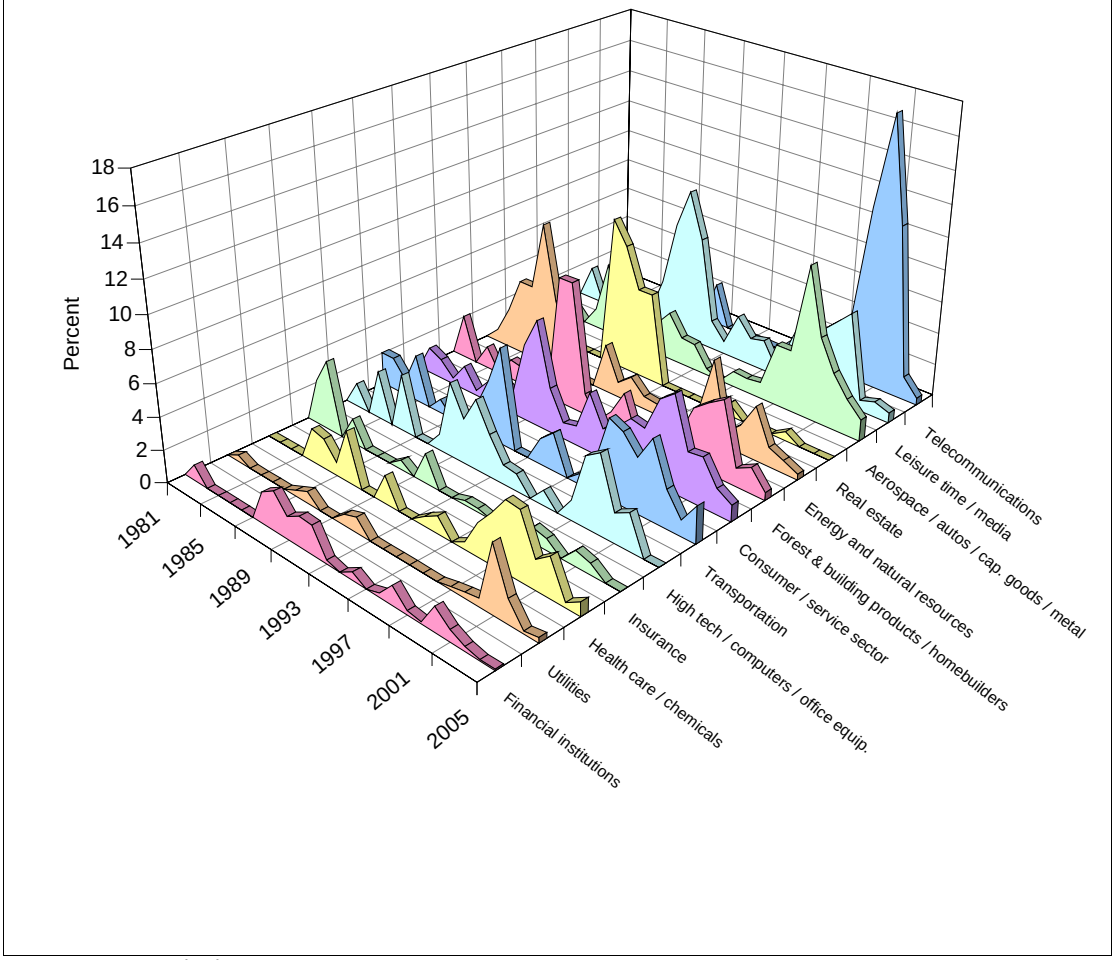
[7] Basel Committee on Banking Supervision, *International Convergence of Capital Measurement and Capital Standards, A Revised Framework*, Annex 2, at 202-205 (updated Nov 2005).

[8] Violi, R., *Credit Ratings Transition in Structured Finance*, Bank for International Settlements, CGFS Working Group on Ratings in Structured Finance, at 2 (Dec 2004) (http://www.bis.org/publ/cgfs23violi.pdf).

[9] Jorion, P., C. Shi, and S. Zhang, *Tightening Credit Standards: Fact or Fiction*, working paper, at 2-3 (Dec 2005) (footnote omitted) (http://www.gsm.uci.edu/~jorion/papers%5Ctightening.pdf).

Unfulfilled Aspiration: Although the rating agencies embraced the goal of constant rating definitions, their reach has exceeded their grasp. Numerous studies – both by the rating agencies and by others – reveal that bonds from different sectors and from different times have displayed a wide range of real-world credit performance. For example, Chart 1 shows vividly that different corporate sub-sectors have experienced different default rates over the past 25 years. It shows not only that real-world credit performance varies among sectors but also that it varies within sectors over time.

Chart 1
Annual Default Rates by Industry, 1981-2005
(as reported by Standard & Poor's)



Source: Standard & Poor's

Likewise, we have investigated ABS and CMBS defaults across sub-sectors and found notable differences in real-world credit performance between different types of structured finance securities and within sub-sectors at different times.[10]

Nonetheless, the fact that real-world credit performance does not match idealized definitions of rating agency symbols is not a legitimate cause for criticizing the rating agencies. The real world is noisy and volatile. Indeed, it would be surprising if all sectors of the bond market displayed identical credit

[10] *ABS Credit Migrations*, Nomura fixed income research (9 Jan 2002, updated 5 Mar 2002); *ABS Credit Migrations 2004*, Nomura fixed income research (7 Dec 2004); *CMBS Credit Migrations*, nomura fixed income research (4 Dec 2002); *CMBS Credit Migrations 2005 Update*, (30 Nov 2005).

performance all the time. That would imply an unrealistic level of stability and predictability in the real world.

Accordingly, the divergence between real-world credit performance and idealized rating definitions should not prompt the agencies to abandon constant definitions. Constant definitions help market participants understand the location of the bull's-eye at which a rating agency is aiming when it rates a bond. If an agency keeps moving the bull's-eye, either over time or for different types of instruments, it will (inadvertently) confuse market participants about the meaning of the ratings.

The Erosion of Constant Meanings: Standard & Poor's and Moody's already have started to embrace variable meanings for the ratings on their respective rating scales.

The advent of CDOs in the mid-1980s was a watershed event for the evolution of rating definitions. Until the first CDOs, rating agencies were only producers of ratings; they were not consumers. With the arrival of CDOs, rating agencies had to use their previous ratings as ingredients for making new ratings — they had to learn to eat their own cooking. For rating CDOs, the agencies used ratings as the primary basis for ascribing mathematical properties (*e.g.*, default probabilities or expected losses) to bonds.

Until the late 1990s, CDOs were backed almost exclusively by corporate obligations. The long-term historical performance of corporate bonds became the touchstone for defining the idealized mathematical attributes associated with each rating symbol.[11] Then, obligations from other sectors started to appear as collateral for CDOs. At that point, the rating process for CDOs became the crucible in which the agencies had to confront the fact that similarly rated bonds from different sectors had markedly different track records.

S&P appears to have reacted first. When the agency embraced a simulation-based rating methodology for CDOs in 2001, it started using different "implied asset default rates" for ABS and corporate bonds.[12] However, the agency refrained from disclosing a complete table of default rates over time for the separate asset classes. Several months later, when S&P published its updated criteria for cash flow and synthetic CDOs, it continued to disclose only a partial table.[13] By not releasing complete tables of default probabilities for ABS and corporate bonds, S&P temporarily sidestepped the problem of having multiple definitions associated with its rating symbols. Later, when S&P addressed the treatment of municipal bonds in CDOs, it acknowledged the stronger historical performance of the municipal sector but it still refrained from publishing tables with different idealized default rates for the different sectors.[14]

Then, in December 2005, when S&P announced the release of version 3.0 of its CDO Evaluator software, the agency published complete tables of default probabilities for ABS/MBS, corporate bonds, and CDOs.[15] In doing so, it created conflicting definitions for its rating symbols depending on the types of instruments to which they apply.

Then, just six months later, S&P revised the ABS/MBS default definitions when it released version 3.2 of the software.[16] Although S&P did not include the complete new table in an updated "technical

[11] *See, e.g.*, Cifuentes, A. and G. O'Connor, *The Binomial Expansion Method Applied to CBO/CLO Analysis*, Moody's special report (13 Dec 1996) (Table 2); Backman, A. and G. O'Connor, Rating Cash Flow Transactions Backed by Corporate Debt 1995 Update, Moody's special report, at 2 (7 Apr 1995) ("The aggregate credit risk of a corporate debt portfolio is composed of the default probability and potential loss severity of each asset in the pool. Such risk is explicitly addressed by the rating Moody's assigns to each asset in the portfolio.");

[12] Bergman, Sten, *CDO Evaluator Applies Correlation and Monte Carlo Simulation to the Art of Determining Portfolio Quality*, S&P special report, at 6 (12 Nov 2001)

[13] *Global Cash Flow and Synthetic CDO Criteria*, S&P, at 46 (21 Mar 2002).

[14] *Public Finance Criteria Book*, S&P, at 305-307 (12 Apr 2005).

[15] Gilkes, K., N. Jobst, and B. Watson, *CDO Evaluator Version 3.0: Technical Document*, S&P criteria report, Appendix A (19 Dec 2005).

[16] *Standard & Poor's CDO Evaluator™ Version 3.2 Frequently Asked Questions* (19 Jun 2006).

document" accompanying the release of the new software, the rating agency described the nature of the changes in the related "FAQ" document. To see the full table, market participants had to look at the spreadsheets that form a part of the software. However, S&P fully crossed the Rubicon of divergent definitions when it published the Technical Document for version 3.0 of the software on 19 December 2005. The fact that it did not include the new ABS/MBS rating definitions in a proper research report only adds to the confusion and does not diminish or nullify the fact that the definitions changed. Interestingly, the package of changes included both increases and decreases in the default probabilities associated with different ABS/MBS rating levels over different time horizons (see Table 2 above).

Chart 2 shows the default probabilities from version 3.2 of S&P's software for time horizons of three, five, and seven years. For example, over time horizons of both five years and seven years, S&P ascribes a higher default probability to a CDO rated AA than to an ABS rated A. Over a three year time horizon, a CDO rated AA has a higher probability of default than an ABS rated A-.

The tables have some bizarre implications: Suppose you have a seven-year ABS rated AA+. According to the tables, the instrument has an idealized default probability of 0.168%. If we repackage the security (all by itself) and call the repackaged instrument a CDO, it ought to get a rating of AAA because the idealized default rate for the AAA-rated CDOs is 0.285% over seven years. This seems simply an affront to common sense. It illustrates why variable definitions of rating symbols are a problem.

The Moody's story is slightly different. In November 2002, Moody's released its rating methodology for CDOs that include municipal bonds. In developing the methodology, Moody's had to confront a significant performance discrepancy between municipal bonds and other types of instruments. For bonds at any given rating level, municipal bonds experienced lower levels of losses and defaults than other types of bonds. Instead of updating its rating methodology for munis (and possibly upgrading thousands of bonds), Moody's decided to embrace different definitions for rating symbols when applied to munis. The Moody's report stated:

> In rating a municipal CDO, Moody's will assume that the Rating Factor associated with a municipal bond is one half of the Rating Factor that would apply to a corporate bond with the same rating. This assumption is intended to conservatively reflect the observation that the historical default frequency in the Moody's-rated municipal arena is substantially less than that of similarly rated corporate bonds. The full corporate Rating Factor will be applied to tax-exempt corporate bonds.
>
> While Moody's recognizes that the municipal default experience has been a fraction (even below our assumption of one half) of the corporate default experience in the post-Depression era, we believe that using stressed assumptions is necessary to account for certain factors. First, the fact that there have been so few rated municipal defaults also means that the municipal default data set contains less information than the corporate default data set on which to base meaningful assumptions as to default behavior. Second, Moody's ratings of structured products are designed to be robust under certain levels of stress, from moderate to substantial as the target rating of a CDO tranche increases. Finally, our analysis must also acknowledge that under severe economic conditions, probabilities of default across municipal sectors may rise significantly and contemporaneously.[17]

However, in contrast to S&P, inconsistencies in Moody's rating scales appear confined to the municipal bond area. In responding to questions from European regulators in 2005, Moody's stated:

> Moody's global corporate, structured finance, and non-US public finance ratings use the same symbol system and are intended to convey comparable information with respect to the relative risk of expected credit loss. Moody's ratings on public finance securities issued in the US tax-exempt market use the same symbol system but correspond to a different set of expectations of relative expected loss and thus are not intended to be compared directly to our other ratings.[18]

[17] Chen, N., S. Lioce, and L. Washburn, *Moody's Approach to Rating US Municipal Cash-Flow CDOs*, Moody's rating methodology, at 3 (26 Nov 2002) (footnote omitted).

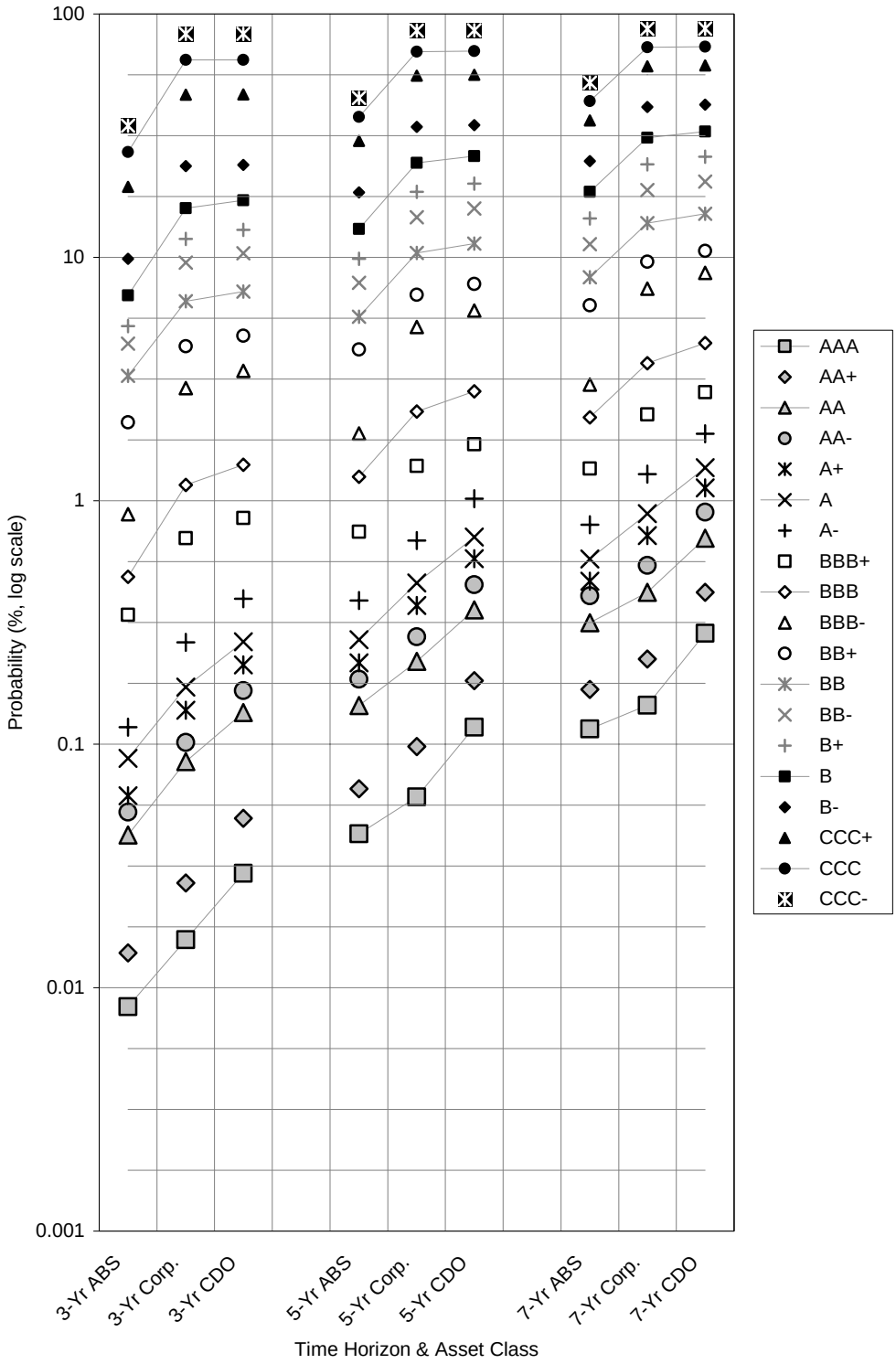
[18] Response of Moody's Investors Service to The Committee of European Banking Supervisors' Consultation Paper on the Recognition of External Credit Assessment Institutions (30 Sep 2005) (http://www.c-ebs.org/documents/MOODY_CP07A.pdf) (citing *Moody's US Municipal Bond Rating Scale*, Moody's special comment (Nov 2002) (http://volatility.brannan.org/2004docs/US%20Muni%20Rating%20Scale.pdf)) .

Recently, Moody's proposed a methodology for "mapping" its municipal bond ratings onto its corporate rating scale based on the expected severity of loss following defaults.[19] The proposed system would reinforce the continuing existence of two separate rating scales.

Conclusion: As long as the rating agencies continue to use variable meanings for their rating symbols, it will be difficult for market participants to use ratings to compare risk across different sectors of the fixed income market. Risk management activities will become more complicated and credit derivative trading activities will bear the additional burden of verifying the meaning of bond ratings as applied to reference credits. Perhaps most important, regulations that presume constant meanings will likely fail to achieve their desired objectives. The bottom line is that the market needs ratings that are clear and honest measures of credit quality. The rating agencies need to remember that and to return to their previous practice (or aspiration) of constant, uniform, definitions for their rating symbols.

[19] Richman, N. et al., *Request for Comment: Mapping of Moody's U.S. Municipal Bond Rating Scale to Moody's Corporate Rating Scale and Assignment of Corporate Equivalent Ratings to Municipal Obligations*, Moody's special comment (23 Jun 2006)

Chart 2
Default Probabilities Used in S&P CDO Rating Criteria



Source: Standard & Poor's CDO Evaluator ver. 3.2

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