SECURITIES LITIGATION
& CONSULTING GROUP

What Does a Mutual Fund's Average Credit Quality Tell Investors?

by
Geng Deng, Craig McCann
and Edward O'Neal[1]

Managers of bond mutual funds frequently report an "Average Credit Quality" statistic in their marketing materials. This statistic is based on Standard & Poor's and Moody's assessment of the credit risk of the individual bonds in the portfolio and is reported to mutual fund investors using the familiar letter scale for rating the credit risk of bonds. For example, a mutual fund might report that it has an Average Credit Quality of "A" or perhaps more finely as "A-". Mutual fund research service providers such as Morningstar also calculate and disseminate Average Credit Quality statistics.

The Average Credit Quality statistic as typically calculated by the mutual fund companies and by Morningstar significantly overstates mutual funds' true credit quality. Given how this statistic is calculated, portfolio managers can easily manipulate their holdings to significantly increase their credit risk and thereby their yield without increasing their *reported* credit risk. Since bond fund managers compete for investors based on yield and risk, fund managers who report Average Credit Quality have the ability and the incentive to increase but underreport the credit risk in their bond mutual fund portfolios.

In this note, we explain the methodological flaw in the way Average Credit Quality statistics are calculated and provide simple examples of its systematic understatement in credit risk.

INTRODUCTION

Bond and bond mutual fund investors are exposed to credit risk because there is uncertainty over bond issuers' ability to make promised principal and interest payments. For example, the market value of a 20-year, 8% coupon Exxon-Mobil bond will reflect an estimate of the probability that Exxon-Mobil might not make all the $40 semi-annual coupon payments and repay the bond's $1,000 face value at maturity. The market value

 Dr. Deng can be reached at 703-890-0741 or gengdeng@slcg.com, Dr. McCann can be reached at 703-246-9381 or craigmccann@slcg.com and Dr. O'Neal can be reached at 336-665-8718 or eddieoneal@slcg.com.

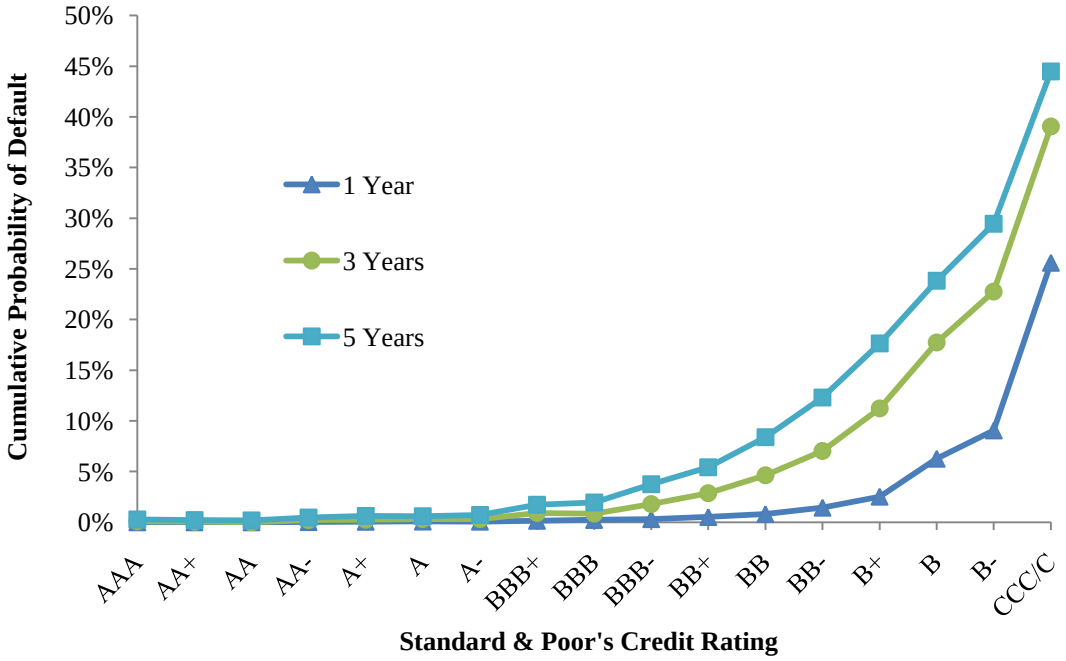
of the Exxon-Mobil bond will fluctuate because of changing views of Exxon-Mobil's creditworthiness, separate and apart from fluctuations due to changes in the general level of interest rates or the required compensation for any particular level of creditworthiness.

Investors rely on credit rating companies – particularly Standard & Poor's and Moody's – to assess, report and monitor the credit risk of bond issuers. These companies use a simple alphanumeric scale from AAA or Aaa down through D to reflect varying degrees of credit risk. The credit ratings reflect the relative probability that an issuer will default on a bond's promised payments or the relative expected loss investors might suffer as a result of default.[i]

Standard & Poor's and Moody's publish studies of the default and post-default experience of bonds to which they had assigned credit ratings. This published research provides feedback the ratings companies use to improve the accuracy with which their ratings in fact predict relative credit risk. The companies' studies also inform investors and their advisors directly and indirectly through the business press of the relative risk of investing in bonds of differing credit qualities.

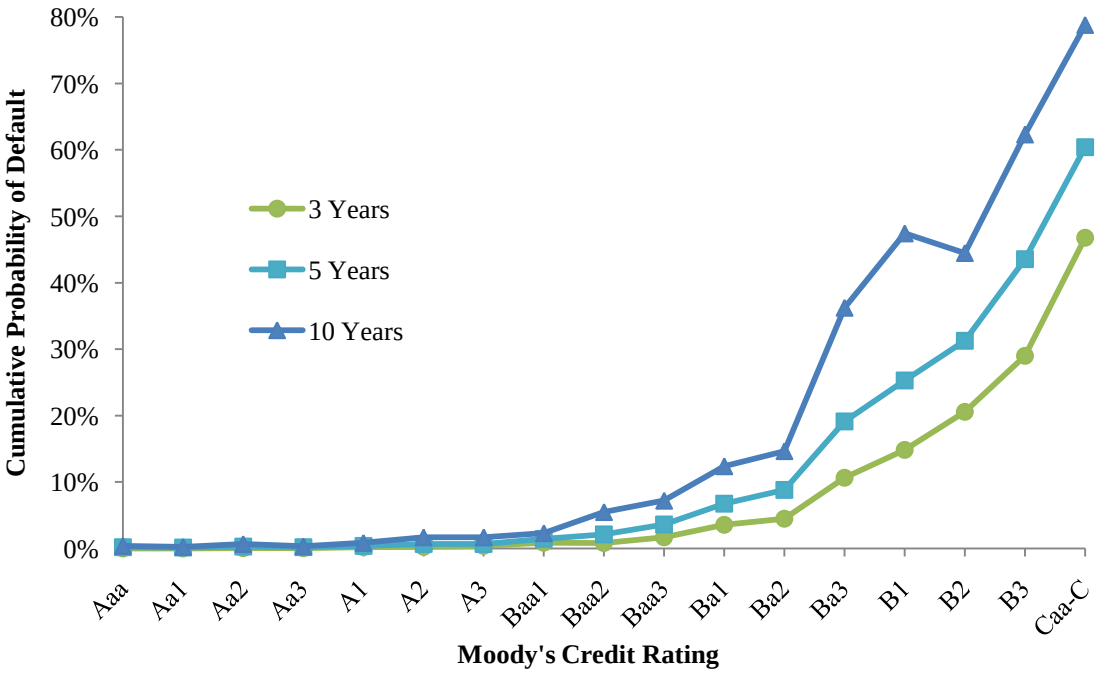
Exhibit 1 plots the one-, three- and five-year default rates for finely divided credit ratings assigned by Standard and Poor's [2008] and illustrates a ubiquitous feature of the credit rating companies' scales: credit risk increases at an increasing rate as we move down through the scale. Exhibit 2 shows the same feature for bonds on Moody's rating scale with a coarser division of rating categories and for time periods of three, five and ten years.

Exhibit 1: 1981-2007 Cumulative Average Default Rates by Initial Rating. The likelihood an issuer will default increases at an increasing rate as S&P's initial bond rating declines.



Standard & Poor's [2008] "Default, Transition and Recovery: 2007 Annual Global Corporate Default Study and Rating Transitions." Standard and Poor's RatingsDirect®, February 5, 2008.

Exhibit 2: 1970-2004 Average Cumulative Default Rates by Initial Rating. The likelihood an issuer will default increases at an increasing rate as Moody's initial bond rating declines.



Moody's [2005] "Default and Recovery Rates of Corporate Bond Issuers, 1920-2004." Moody's Investors Services, (January 2005).

AVERAGE CREDIT QUALITY

Although not a required disclosure, many bond mutual funds report the Average Credit Quality or Average Credit Rating of their funds. This statistic is reported in a summary table that frequently includes Weighted-Average Coupon, Maturity and Yield to Maturity. While Weighted-Average Coupon, Maturity and Yield to Maturity are economically meaningful and comparable to individual bonds and across homogenous bond portfolios, the Average Credit Quality statistic as currently calculated is not.

For the Average Credit Quality statistic to be a useful measure of the credit risk in bond mutual funds' portfolios, it must reflect the average credit risk of the individual securities held in the portfolios. That is, for an Average Credit Quality statistic to not mislead investors, a reported statistic of "AA", or "BBB", must convey the same credit risk as an individual bond or collection of bonds which the ratings companies have rated AA, or BBB. Unfortunately, investors are not told that mutual funds that claim an AA Average Credit Quality for their portfolio might have the credit risk of a portfolio of BBB rated bonds.

As we can see in Exhibits 1 and 2, credit risk increases quite dramatically at an increasing (not constant) rate. All the calculations of Average Credit Quality we have reviewed assume that credit risk increases at a constant rate as we move down through the ratings companies' classification scale. Effectively the mutual fund companies assign a score of 1 through N, where N is the number of ratings categories. The funds then weight these assigned scores by the percentage each category represents in the portfolio to determine a weighted average score. The credit rating from the category with the score closest to this weighted average score is then reported as the Average Credit Quality.

Most funds assign the same risk score to all holdings rated below some cutoff, BB for instance, despite the fact that CCC/C rated bonds contain more than five times as much credit risk as BB rated bonds. In addition, some funds exclude non-rated ("NR") bonds from the calculation of Average Credit Quality.[ii] This exclusion has the effect of assigning all non-rated bonds in a portfolio the average rating of the rated bonds in the portfolio. These practices, in addition to the linear scoring system, yield portfolio credit risk statistics that dramatically understate credit risk.

Consider for example, the Putnam Income Fund. It is a taxable intermediate term bond fund with $1.1 billion in net assets as of September 2009. Putnam claims an Average Credit Quality of AA for the fund. Panel A of Exhibit 3 lists the portfolio quality breakdown detailed in the fund fact sheet from the third quarter of 2009.[iii] Two thirds of the fund's holdings are rated AAA. The remaining one-third is spread among lower rating categories. Putnam claims an Average Credit Quality of AA for the fund. Although Putnam does not disclose how it calculates Average Credit Quality, we show in Panel B of Exhibit 3 that linear mapping of credit quality categories reproduces Putnam's claimed AA quality. We have assigned AAA securities a 1, and simply increased the assignment by 1 for each subsequent rating category.

Exhibit 3: Reported and Corrected Average Credit Qualities of the Putnam Income Fund based on September 2009 holdings

Table presents portfolio quality breakdown, two reported credit ratings based on linear scales, and the correct credit rating by applying S&P Default Probabilities to the percentage holdings in the fund.

A) Putnam Reported Quality Breakdown								
Rating Category	AAA	AA	A	BBB	BB	B	Below B	Unrated
Fund Holdings	66.5%	3.7%	9.4%	11.3%	1.8%	3.3%	4.0%	
B) Credit Quality with Linear Scale 1 to 7								
Fund Linear Scoring	1	2	3	4	5	6	7	
Fund-reported Credit Rating		2.04: AA						
C) Credit Quality with Linear Scale 2 to 8								
Morningstar Linear Scoring	2	3	4	5	6	7	8	
Morningstar Credit Rating		3.04: AA						
D) Credit Quality with Actual Default Rates								
S&P's 5-Year Default Risk[iv]	0.28%	0.28%	0.65%	2.48%	8.70%	23.64%	44.50%	
Correct Credit Rating				3.26: BB to BBB				

Morningstar also reports the average credit quality of Putnam Income Fund as AA.[v] Morningstar [2008] calculates an Average Credit Quality statistic for bond mutual funds using a linear scale very similar to the scale in Panel C of Exhibit 3. Morningstar assigns a "2" to holdings rated AAA and increases the assigned score by 1 with each whole letter grade lower credit rating. It then categorizes funds as High Quality, Medium Quality or Low Quality in its Fixed Income Style Box™ according to the weighted average score. Panel C shows that Morningstar's scale also produces average credit quality of AA. Although we cannot be certain what scale Putnam has used for their

average credit quality calculation, any linear scheme will produce the claimed Average Credit Quality of AA.

Putnam's reported AA Average Credit Quality implies that the Income Fund's probability of default or expected loss due to credit risk is equivalent to a portfolio of AA rated bonds. According to S&P, the cumulative five-year default rate of AA rated securities is 0.28%.[vi] Panel D of Exhibit 3 calculates the weighted average default in the Putnam Income Fund portfolio by weighting S&P's cumulative five-year default rates by the amount invested by Putnam in each rating category. The weighted average five-year default rate for the Putnam Income Fund is 3.26%. This level of credit risk corresponds to securities rated between BBB and BB, more than two whole rating categories below the Average Credit Quality Putnam reported for the Income Fund.[vii] Investors reviewing Putnam's fact sheet or reviewing a Morningstar report for this "AA" fund would have no way of knowing that the credit risk of the Putnam Income Fund is actually 12 times as great as a portfolio of AA rated bonds. The Putnam Income Fund is not unique – we use it here only as an example. Average Credit Quality as reported by fund companies and research service providers will almost always under represent true credit risk.

The linear scale used by Morningstar and the mutual fund companies significantly understates the credit risk in bond fund portfolios because it assumes that lower rated bonds are safer than they actually are relative to higher rated bonds. We illustrate this point by presenting relative default rates of Moody's rating categories in Exhibit 4. Panel A of Exhibit 4 shows the relative default rates of each rating category using a linear scale that assigns a 2 to Aaa securities and increases by 1 for each subsequent whole-letter grade rating category. Panel B of Exhibit 4 presents the relative default rates according to historical default experiences for each rating category as published by Moody's. The numbers in each panel give the default rate of the category across the top row relative to the category along the left column. According to Moody's for example, a Ba rated bond was 89.3 times more likely to default over a five-year period than an Aaa rated bond.[viii] However a linear scale as applied by mutual fund companies and research providers assumes that a Ba rated bond is only three times as risky as an Aaa rated bond.

Exhibit 4: Relative Credit Risk of Moody's Rating Categories

The numbers in each panel give the default rate of the category across the top row relative to the category along the left column.

A) Relative credit risk using linear scale with AAA bonds = 2

	Aaa	Aa	A	Baa	Ba	B	Below B
Aaa	1	1.5	2.0	2.5	3.0	3.5	4.0
Aa		1	1.3	1.7	2.0	2.3	2.7
A			1	1.3	1.5	1.8	2.0
Baa				1	1.2	1.4	1.6
Ba					1	1.2	1.3
B						1	1.1

B) Relative credit risk according to actual default probabilities[ix]

	Aaa	Aa	A	Baa	Ba	B	Below B
Aaa	1	1.7	4.2	17.3	89.3	254.0	497.7
Aa		1	2.5	10.4	53.6	152.4	298.6
A			1	4.2	21.4	61.0	119.4
Baa				1	5.2	14.7	28.7
Ba					1	2.8	5.6
B						1	2.0

As a result of using a linear scale to determine Average Credit Quality when credit risk is in fact increasing at an increasing rate, mutual fund service providers and the fund companies report an Average Credit Quality for the majority of funds that is at least one whole letter credit rating higher than the rating that would accurately convey the credit risk in the mutual funds' portfolios. For many funds, the reported Average Credit Quality is an astounding two whole letter grades higher than the portfolios' credit risk warrants.

Exhibit 5 and Exhibit 6 illustrate that, perversely, "diversification" across credit quality increases credit risk, and the Average Credit Quality statistic allows mutual funds to hide this increased credit risk from investors. The first fund has focused holdings; all the bonds are BBB-rated. The second fund has moderately dispersed holdings, 50% in A+ rated bonds and 50% in BB- rated bonds. The third fund has dispersed holdings, 50% in AAA rated bonds and 50% in CCC/C rated bonds. Under the linear scoring systems used by the mutual fund companies and Morningstar, all three funds would report BBB Average Credit Quality

Exhibit 5: More dispersed bond portfolios have higher risk for any given "Average Credit Quality".

These three portfolios all have a BBB "Average Credit Quality" but the portfolio with dispersed holdings has has 12 times as much credit risk and the moderately dispersed portfolio has 4 times as much credit risk as the focused portfolio.

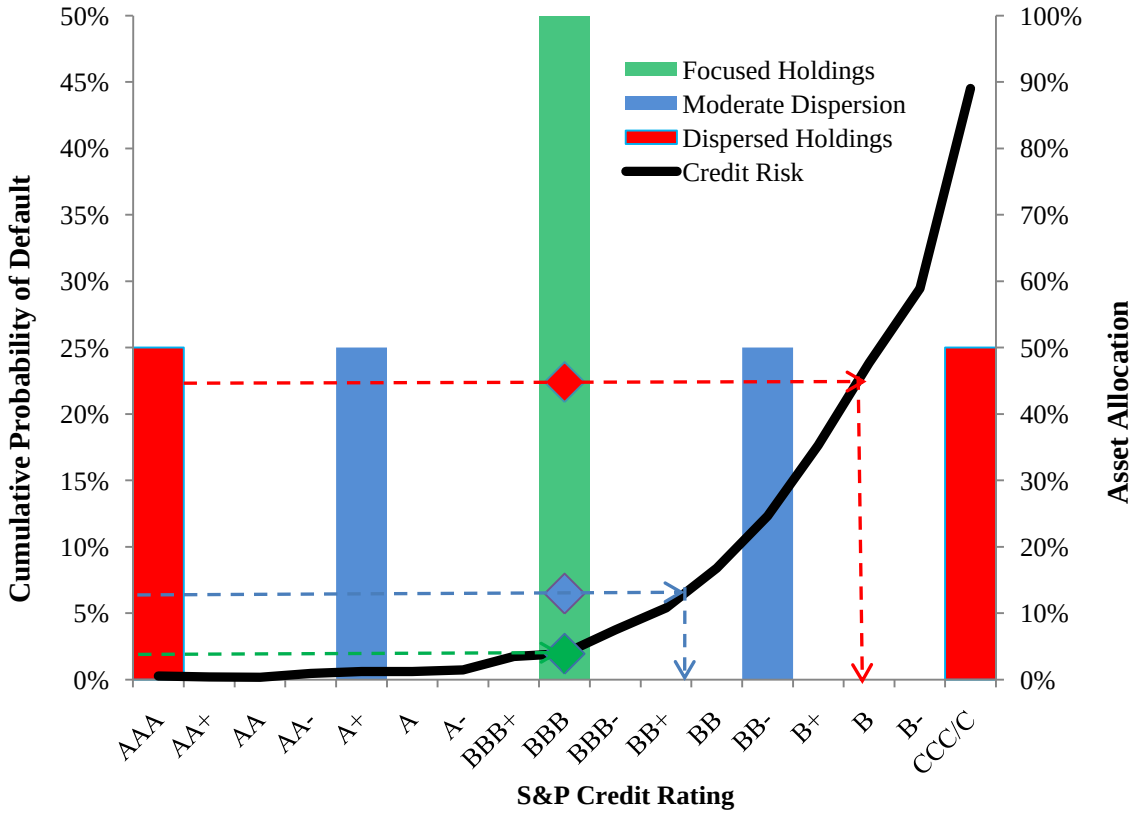


Exhibit 6: Credit Quality Understatement Increases the More Disperse the Fund's Holdings.

Portfolio	Holdings					Average Credit Quality	Probability of Default	Implied Credit Quality
	AAA	A+	BBB	BB-	CCC/C			
Focused			100%			BBB	2.2%	BBB
Moderately Dispersed		50%		50%		BBB	8.6%	BB-
Dispersed	50%				50%	BBB	27.1%	B

The focused mutual fund's portfolio has a five-year cumulative default risk of 2.2% - the same as a portfolio of BBB rated bonds. The moderately dispersed mutual fund has a five-year cumulative default risk of 8.6% - the same as a portfolio of BB rated bonds and four times the risk of a portfolio of BBB rated bonds. The most dispersed fund

has a five-year cumulative default risk of 27.1% - the same as a portfolio of B-rated bonds and twelve times the risk of a portfolio of BBB rated bonds. The three hypothetical funds in Exhibit 6 illustrate the systematic understatement of credit risk in bond mutual funds.

Exhibit 7: Reported and Corrected Average Credit Quality in Intermediate Bond Funds

Morningstar Reported Credit Quality	Corrected Credit Quality	Credit Quality Inflation	Count
Subsamples by Reported Credit Quality			
AAA	AAA	0	2
	AA	1	35
	A	2	9
	BBB	3	1
			47
AA	AA	0	9
	A	1	83
	BBB	2	100
	BB	3	1
			193
A	A	0	5
	BBB	1	30
	BB	2	3
			38
BBB	BBB	0	2
	BB	1	5
			7
Grand Total			**285**
Complete Sample			
		0	18
		1	153
		2	112
		3	2

Exhibit 7 presents a basic analysis of the impact of linear credit scoring on a sample of funds. We gathered recent data on 285 taxable intermediate bond funds from Morningstar's database, after excluding all the duplicative share classes. In this sample of funds, Morningtar gave the following average credit quality ratings: 47 funds were rated AAA, 193 were rated AA, 38 were rated A, and 7 were rated B. For each of the funds in the sample, we applied the actual default rates in each rating category to the funds' percentage holdings to calculate the average default probability of the underlying holdings in each fund. We then mapped the funds' average default probabilities to the S&P letter rating category with the closest default probability. Exhibit 7 shows that only

18 funds (6%) warranted the credit quality assigned by Morningstar. 153 out of the 285 funds (54%) exhibit actual default probabilities that would place them a full letter grade below that assigned by Morningstar. 112 out of 285 funds (39%) exhibit actual default probabilities that would place them two full letter grades below that assigned by Morningstar. Clearly the methodologies currently in use to calculate average credit quality materially understate the credit risk of fixed income portfolios.

Our examples illustrate how mutual funds and mutual fund research providers could very easily report an Average Credit Quality statistic that accurately conveys the default probability of the underlying portfolio. Morningstar and mutual fund companies could report the Standard and Poor's or Moody's letter grade that most closely corresponds to the fund's portfolio's weighted average probability of default or weighted average expected loss. This would lead the focused fund in Exhibit 6 to report "BBB", the moderately dispersed portfolio to report "BB" and the dispersed fund to report "B". These statistics would correspond to the credit risk of the bonds originally rated by Standard and Poor's and Moody's. According to Reichenstein [2004], Morningstar has been quick to incorporate changes that would improve its reports.

IMPLICATIONS

The mutual funds' under-reporting of credit risk via the Average Credit Quality statistic has many statistical and behavioral implications, some of which follow.

Statistical Implications

1. Mutual funds with the same reported Average Credit Quality can have dramatically different amount of credit risk. We find a large fraction of mutual funds' reported Average Credit Quality overstate their credit quality by 2 whole letter grades. As a corollary, mutual funds with any given reported Average Credit Quality may have significantly more credit risk than funds with higher reported Average Credit Quality.
2. Funds with more dispersed holdings will have higher yields than funds of the same reported Average Credit Quality that have more focused holdings. These more dispersed funds will have higher yields because they have additional, undisclosed credit risk. We find that within reported Average Credit Quality ratings funds with

more disperse holdings and therefore lower correctly calculated credit qualities have higher yields.

3. Small reductions in reported Average Credit Quality can mask dramatic increases in credit risk.

Behavioral Implications

1. Funds that voluntarily report an Average Credit Quality statistic will hold a more dispersed portfolio than funds that do not.
2. Funds that report an Average Credit Quality statistic will focus their holdings within a letter category in the highest risk third of the distribution of bonds within that whole letter grade.
3. Funds that previously had not reported a statistic but which start reporting one will disperse their portfolio over time exposing investors to more credit risk without disclosing this additional risk.
4. Morningstar's 4-Star and 5-Star rated bond funds will tend to be funds with the most undisclosed credit risk within their categories.
5. The understatement of credit risk of bond mutual funds will increase the demand for low rated bonds and high rated bonds relative to mid rated bonds across the whole letter grade scale and will increase the demand for low rated bonds relative to high rated bonds within a whole letter grade category.

CONCLUSION

Mutual fund companies report a statistic that understates the credit risk in most bond mutual fund portfolios. Morningstar calculates essentially the same statistic, essentially the same way. As a result of the dissemination of this misinformation, bond mutual investors may be led to take on more credit risk than they would otherwise take and to receive less compensation for any given level of credit risk. The problems highlighted in this paper are not confined to open end mutual funds. Any fixed income portfolio for which the manager calculates a flawed average credit quality statistic will most likely be materially more risky than represented. This problem would be present in

closed end funds, ETFs and in the provision of separate account management of fixed income portfolios. Separate account managers that present average credit quality statistics to high net worth and institutional investors are likely presenting the products they manage as having less credit risk than they actually do.

REFERENCES:

Moody's. "Default and Recovery Rates of Corporate Bond Issuers, 1920-2004." Moody's Investors Services, (January 2005).

Morningstar. "Morningstar Fixed Income Style Box™ Methodology." Morningstar Methodology Paper, October 31, 2008.

Reichenstein, William. "Morningstar's New Star Rating System: Advances and Innovations." Journal of Financial Planning, (March 2004), pp. 40-47.

Standard and Poor's. "Default, Transition and Recovery: 2007 Annual Global Corporate Default Study and Rating Transitions." Standard and Poor's RatingsDirect®, February 5, 2008.

[i] Standard and Poor's, Moody's and Fitch are Nationally Recognized Statistical Ratings Organizations ("NRSROs"). We don't address herein whether the credit ratings assigned by the NRSROs to individual securities are accurate, unbiased or comparable across security types. We only address how the linear scoring system used by mutual fund companies and research service providers significantly and systematically overstates the true credit quality of bond mutual funds.

[ii] Mutual fund service providers typically exclude non-rated securities from the calculation. However, mutual fund marketing materials suggest that at least some mutual funds assign their own ratings to the non-rated securities before calculating average credit quality. This practice, of course, is fraught with other potential problems.

[iii] At the time of publication, this fact sheet could be found at https://content.putnam.com/literature/pdf/FS035.pdf.

[iv] Five year default rates for each category are found by averaging the default rates across each subcategory within the rating category. For example, the default rate for BBB rated securities is the simple average of the default rates on BBB+, BBB, and BBB- securities. Raw default rate data are from Standard & Poor's [2008].

[v] The reported credit quality is from Morningstar Principia Pro Plus for Mutual Funds, September 2009 release. This Morningstar release has portfolio statistics for this fund that are based on the holdings in the fund as of June 2009.

[vi] Raw default rate date are from "2007 Annual Global Corporate Default Study and Rating Transitions," published by S&P. S&P shows default rates on a finer scale for AA+, AA, and AA-. We take the simple average of these three default rates as the default rate for the coarser AA category.

[vii] We show this example using 5-year default rates over the period 1970 – 2004 as reported by Moody's. The result is qualitatively similar if we use 3-year default rates.

[viii] The actual 5-year Moody's default rates are 0.12% for Aaa bonds and 10.72% for Ba bonds.

[ix] Relative default probabilities are derived from raw default rate data in Moody's [2005].