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DRAFT, For Discussion Purposes

Joint P&C/Health Bond Factors Analysis Work Group Report to NAIC “Joint Health  
RBC and P/C RBC Drafting Group”

Risk Charges for Speculative Grade (SG) Bonds

May 29, 2018

The American Academy of Actuaries is a 19,000-member professional association whose mission is to serve the public and the U.S. actuarial profession. For more than 50 years, the Academy has assisted public policymakers on all levels by providing leadership, objective expertise, and actuarial advice on risk and financial security issues. The Academy also sets qualification, practice, and professionalism standards for actuaries in the United States.

## 1. Introduction & Context

### Introduction

This material is an update on the status of work being done by the American Academy of Actuaries’ (Academy) Joint P&C/Health Bond Factors Analysis Work Group (PCHWG), for the National Association of Insurance Commissioners (NAIC) “Joint Health RBC and P/C RBC Drafting Group” (NAIC Drafting Group). The analysis deals with certain aspects of risk-based capital (RBC) factors related to risk charges for fixed income securities.

This material is preliminary. The PCHWG is providing this material to the NAIC Drafting Group at this point to facilitate discussion of relevant issues, recognizing that our work will likely evolve for a variety of reasons, including the input from our discussions with the NAIC Drafting Group.

The material may be revised, perhaps materially, by the PCHWG based on further discussion and analysis.

### Context

This material builds on the PCHWG January 31, 2018 Discussion Draft (January Draft) analysis of Investment Grade Bond risk charges (NAIC classes 1 and 2) presented to the NAIC Drafting Group and again at several subsequent conference calls and meetings of various NAIC working groups dealing with RBC matters.

This material relates to risk charges for Speculative Grade Bonds (NAIC classes 3-6).

The material applies to both Health and Property/Casualty RBC Formulas.

### Treatment of Federal Income Taxes (FIT) in Calibration

We do not intend to address the treatment of FIT in calibration in this report. However, our analysis of SG bond risk charges is affected by the FIT treatment. This is problematic because documentation is not clear on whether the current risk charges are intended to be Before federal income tax (BFIT) or after federal income tax (AFIT).<sup>1</sup> Three implications of that situation are the following:

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<sup>1</sup> On one hand, the original fixed income risk charges for P&C, Health, and Life were identical, except for the adjustment for below-investment-grade bonds. Life insurance RBC risk charges are currently understood to be on an AFIT basis. From that perspective, Life, P&C, and Health risk charges would be on the AFIT basis.

On the other hand, the underwriting risk charges in P&C and Health RBC formulas are on a BFIT basis. If investment risk charges were intended to be on the same basis as underwriting risk, then the investment risk charges are on a BFIT basis.

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1. Depending on the tax basis that the NAIC selects, the risk charge indications in this report would need to be adjusted accordingly.
2. The comparison of current risk charges to indicated risk charges in this report might not be fully consistent with respect to the treatment of FIT.
3. In each exhibit in this report, we note the FIT treatment of current and indicated risk charges and any inconsistencies or ambiguities in comparison. In those notes, we refer to the current risk charge FIT calibration basis as “current FIT calibration basis”

## Summary

In this material we have developed Speculative Grade (SG) bond risk charges after considering both default risk measures and market risk measures.

In Table 7, we show the indicated risk charges based on our work-to-date and the assumptions presented in this report.

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These contradictory interpretations arise, in large part, because there is no NAIC documentation of the considerations underlying the choice of the same risk charges for Life and P&C notwithstanding differences between Life and P&C or Health, in areas such as statutory accounting, time horizon of assets and liabilities and tax treatment for other risk areas in the RBC Formula.

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## SG Bond Risk Charge Analysis –Default Risk Analysis

The risk charges for Investment Grade (IG) bonds, NAIC classes 1 and 2, are based on default risk, as described in the January Draft and, more extensively, in material prepared by the Academy Life Capital Adequacy Committee’s C1 Work Group (C1WG).

Table 1, below, shows the SG risk charges based on the default risk approach described for IG bonds in our January Draft, applied without the adjustment for the market value element of the SG bonds in Statutory Accounting. We show the results using several time horizons.<sup>2</sup> We show results summarized into Standard and Poor’s (S&P) categories, without +/- modifiers, to make the format consistent with the market value information presented later in this report.

**Table 1**  
**Indicated Risk Charges Based on Default Rates**  
**Before Adjustment for Statutory Accounting Market Value basis of SG Bonds**

Investment Rating	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	S&P Rating Class	Current NAIC Class	Current Risk Charge	1-Year time horizon	4-Year time horizon	5-year time horizon	10-year time horizon
IG	AAA	1	0.3%	0.0%	0.1%	0.2%	0.3%
	AA	1	0.3%	0.0%	0.4%	0.5%	0.8%
	A	1	0.3%	0.2%	0.9%	1.1%	1.8%
	BBB	2	1.0%	0.5%	1.5%	1.9%	3.5%
SG	BB	3	2.0%	1.5%	6.4%	7.8%	12.7%
	B	4	4.5%	3.7%	16.4%	19.4%	30.4%
	CCC	5	10.0%	19.4%	43.2%	48.7%	68.7%
	CC	6	30.0%	Not modeled	Not modeled	Not modeled	Not modeled
Stocks	S&P 500		15.0%				

Note: Within each S&P class there are usually 3 sub-classes. We calculate the indicated risk charge for the S&P class as the unweighted average of the three values.

Indicated risk charges, column 4-7 are on a BFIT basis, while current fixed income and stock risk charges, column 3, are on the current FIT calibration basis. Therefore, depending on current FIT basis, the current and indicated risk charges may be on different tax basis.

### Updated Default Risk Calibration of SG bond risk charges

The original (and unchanged) risk charges for SG bonds, for P&C and Health insurers, were set equal to 50% of the Life insurance risk charges at the time (1994), and the Life insurance charges were based on default rates. The 50% is described as representing the difference between risk charges for assets valued at the lower of market value or amortized cost and risk charges for the same assets valued at amortized cost.

<sup>2</sup> Time horizon discussed in the January Draft.

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Using the data in Table 1, Table 2, below, shows the indicated risk charges after applying that 50% adjustment to the indicated risk charges for SG bonds from Table 1.

**Table 2**  
**Indicated Risk Charges Based on Default Rates**  
**After 50% Adjustment for SG Bonds**

(1)	(2)	(3)	(4)	(5)	(6)	(7)
S&P Rating Class	Current NAIC Class	Current Risk Charge	1-Year time horizon	4-Year time horizon	5-year time horizon	10-year time horizon
<b>Investment Grade Bonds - No Adjustment</b>						
AAA	1	0.3%	0.0%	0.1%	0.2%	0.3%
AA	1	0.3%	0.0%	0.4%	0.5%	0.8%
A	1	0.3%	0.2%	0.9%	1.1%	1.8%
BBB	2	1.0%	0.5%	1.5%	1.9%	3.5%
<b>Speculative Grade Bonds - After 50% Adjustment for the fact that these bonds are reported in the Annual Statement at the lower of amortized cost or market value</b>						
BB	3	2.0%	0.7%	3.2%	3.9%	6.3%
B	4	4.5%	1.8%	8.2%	9.7%	15.2%
CCC	5	10.0%	9.7%	21.6%	24.3%	34.3%
CC	6	30.0%	Not modeled	Not modeled	Not modeled	Not modeled
<b>Stocks- Risk Charge Based on Market Value Risk</b>						
S&P 500	NA	15.0%	NA	NA	NA	NA

Note: As in Table 1, indicated risk charges, column 4-7 are on a BFIT basis, while current risk charges, column 3, are on the current FIT calibration basis. Therefore, depending on current FIT basis, the current and indicated risk charges may be on different tax basis.

Table 2 includes the current risk charge for unaffiliated common stocks (stocks)<sup>3</sup>.

The class 3, 4 and 5 risk charges are each roughly double the risk charges for the next ‘safer’ risk class, creating a plausible risk differential by class. The class 5 charge is 2/3 the stock risk charge, lower but not too much lower than the stock risk charge.

<sup>3</sup> We recognize that within the P&C/Health RBC Formulas, there are other risk charges related to market risk. Schedule BA assets have a risk charge of 20%. The risk charge for affiliate stock investments is 22.5%.

Also, the Life risk charge for stocks is 30% BFIT and 20% AFIT.

Relative to those alternatives, we use the stock risk charge as a base because (a) it is one reasonable choice, (b) there is substantial long-term data on stock market variability, useful for calibration, (c) stocks are the main balance sheet item, for P&C companies, with risk charges calibrated to market value variability, and (d) stock price variability is often used as a benchmark for market risk.

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Looking at columns 5 and 6, using 4-year and 5-year time horizons under consideration for calibration of P&C IG bonds, for bond ratings below AAA, we see that the indicated risk charges are higher than the current risk charges for IG and SG bonds.

Appendix 1, the material highlighted in yellow, presents Feldblum’s (1996) understanding of the rationale for the calibration approach and the 50% adjustment. The basis for the 50% adjustment is simplified.<sup>4</sup> The basis may have been a reasonable compromise among considerations that we are not aware of. We believe the 50% was used, at least in part, because the results appeared reasonable, as discussed above in the discussion of column 3, especially for a risk charge that was not expected to have significant impact on the overall RBC values.<sup>5</sup>

In the next section we examine the SG risk charges from a market value perspective.

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<sup>4</sup> A few of the simplifications in selecting the 50% adjustment are the following. First, the fact that there is overlap between market valuation and risk, referred to as ‘double counting,’ does not mean that the overlap is 50-50. Second, the analysis does not explicitly address the risk of market valuation resulting from the statutory accounting treatment of those bonds. Third, the default risk charge calculation assumes that the bonds would be held to maturity, or replaced by bonds of similar rating. There is no reason to assume that, for P&C and Health insurer’s portfolios, SG bonds will be held to maturity or replaced by SG bonds at maturity. Fourth, the analysis did not consider that the Life insurer risk charge had offsets for aspects of Life insurance financial reporting that do not apply to P&C or Health insurers.

<sup>5</sup> SG bond risk charges have a small effect on RBC values largely because P&C and Health insurers hold a relatively small amount in speculative grade bonds, as a percent of all assets held.

[Note: We intend to provide some supporting data in the final report.]

## SG Bond Risk Charge Analysis – Market Value Risk Analysis

For Speculative Grade (SG) bonds, current NAIC classes 3-6, we consider market value risk (market risk), along with default risk. We do so for the following reasons:

1. SG bonds are reported at the lower of market value/fair value<sup>6</sup> and amortized cost, for Statutory Accounting purposes, for P&C and Health Companies.<sup>7</sup>

Therefore, unlike the situation for IG bonds, Annual Statement financial reporting for an insurer holding SG bonds is affected by fluctuation in market values. We refer to that fluctuation as market risk.

2. The calibration of risk charges for IG bonds of each rating class assumes that bonds of that class would be held through the selected time horizon.

That assumption is less valid for SG bonds, as there is no business necessity for P&C or Health insurers to hold SG bonds over any specific time horizon. SG bonds can be sold to purchase IG bonds any time, based on market conditions and the financial condition<sup>8</sup> of the insurer. To the extent that SG bonds are treated as saleable at any time, the bond values are subject to market risk.

### Market Risk Calibration of SG bond risk charges

We use three approaches to measure market risk. In each case we measure the SG bond risk relative to the risk in the S&P 500 index, which was used to calibrate the market risk for stocks. These three approaches are as follows:

1. Using fluctuations in the differential between amortized value and fair value for Life insurer bond portfolios of SG bonds<sup>9</sup> versus S&P 500 fluctuations during the 2008 financial crisis.

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<sup>6</sup> For purposes of this report we treat fair value as the same as market value.

<sup>7</sup> And at amortized cost for Life insurance companies. SSAP No. 26

<sup>8</sup> For example, it is reasonable to expect that, in case of financial stress, the insurer or regulator in control of the insurer would sell SG bonds and replace those with IG bonds, at or before maturity of those SG bonds.

<sup>9</sup> The Life insurance fair value and statement value (amortized cost) data is from company-by-company Schedule D for Annual Statements at years-ended December 31, 2007 through December 31, 2016, provided to us by the NAIC.

A period longer than 10 years might have been helpful, but the NAIC no longer retains Annual Statement data for more than 10 years.

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2. Using S&P bond index fluctuations<sup>10</sup> versus stock value fluctuations during the 2008 financial crisis.
3. Using S&P bond index 10-year<sup>11</sup> standard deviations compared to S&P 500 standard deviations for a 10-year period including the financial crisis.

We present each of those analyses in the sections below. In the final section of this report we summarize the indications from the various methods and provide a strawman proposal for discussion with the NAIC Drafting Group.

The data and analysis is available to us only for the S&P rating classes without modifiers. In the final section, we discuss risk charges in the 20 groups requested by the NAIC.

In each of these analyses we use the current P&C stock risk charge, 15%, as a basis for calibrating the SG risk charges. That decision has the following implications:

1. The FIT basis of the indicated SG risk charges is, therefore, the same as the FIT basis of the 15%, which is not completely clear in NAIC documentation.
2. If the NAIC were to conclude the 15% risk charge should be changed, then the indicated SG risk charges would need comparable changes.

#### 1. Indications from insurance company bond value variation versus S&P 500 variation

From Life insurer Annual Statements, Schedule D, we calculate the year-by-year ratios of the all-company fair value to the all-company total carried value (which we use as a proxy for amortized value), for SG bonds by NAIC rating class, for all assets having both valuations.

The amortized cost provides an asset value that is not sensitive to market value changes, but it does reflect changes in assets from year-to-year. The fair value reflects changes in market values as well

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We find that the fair value and statement value data is not shown for all assets for each company, but the gaps did not seem systemic enough to have affected our result. We used Life insurer data, as P&C and Health insurers' carried value does not equal amortized cost.

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<sup>10</sup> We used S&P published bond indices, for example “B” rated bonds at <https://us.spindices.com/indices/fixed-income/sp-us-dollar-global-high-yield-corporate-bond-b-index>.

A large list of S&P bond indices, with links to individual indices is at:

<https://us.spindices.com/additional-reports/all-returns/index.dot?parentIdentifier=aee74419-92ae-4da5-9b90-ebca8976ff49&sourceIdentifier=index-family-specialization&additionalFilterCondition=>

The data at the website covers a rolling ten-year period. We downloaded data from March 31, 2008 through April 2018. We used that data for our worst-year test. Because it is rolling data, data downloaded at different times will cover different time periods.

<sup>11</sup> Ten years ending March 31, 2018, from the S&P website “fact sheet.”

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as changes in assets from year-to-year. We used the ratio so that we can compare pairs of year-ends as the actual assets would likely change from year-to-year. Table 3, Part A, shows those ratios. Table 3, Part B shows the year-to-year percentage changes in those ratios from Part A. Looking at the 2007 column compared to the 2008 column, we see the decline in fair value of SG bonds relative to amortized cost. For example, for class 5 we see a decline from 98% of amortized cost in 2007 to 71% of amortized cost in 2008. Looking at the 2008 column in Part B, we see this is a 27.3% decline in value.

In Part B, we also show the change in the S&P 500 index.

**Table 3**  
**Comparison of market value movements of SG Bonds and Stocks 2008-2017**

<b>Part A: Ratio of Fair Value to Statement Value</b>										
<b>Life Insurance Industry at Each Year-End</b>										
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
3	99%	83%	97%	101%	101%	105%	104%	103%	98%	101%
4	97%	78%	97%	100%	101%	103%	101%	102%	93%	100%
5	98%	71%	95%	100%	95%	101%	102%	98%	95%	99%
<b>Part B: Percentage Change from Year-to-year from Part A</b>										
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
3		-16.1%	17.5%	3.7%	-0.1%	3.9%	-0.9%	-0.4%	-5.2%	2.9%
4		-19.6%	23.3%	3.6%	0.7%	1.9%	-1.2%	0.4%	-8.4%	7.2%
5		-27.3%	33.0%	5.3%	-4.8%	6.6%	0.2%	-3.4%	-2.9%	4.1%
S&P 500 Index		-37.0%	26.5%	15.1%	2.1%	16.0%	32.4%	13.7%	1.4%	12.0%

Using the 15% stock risk charge as a base, we can use the 2008 experience to calculate indicated SG bond risk charges as shown in Table 3- Part C.

**Table 3 - Part C**  
**SG Bond Risk Charges Based on 2008 Market Value Experience for Insurers’ Portfolios**

(1)	(2)	(3)	(4)	(5)
Current NAIC Class	2008 Decline	Ratio to S&P 500	Indicated risk charge	Current Risk Charge
3	-16.1%	0.436	6.5%	2.0%
4	-19.6%	0.531	8.0%	4.5%
5	-27.3%	0.738	11.1%	10.0%
S&P 500 Index	-37.0%	1.000	15.0%	15.0%

Column 2 shows the decline in fair value from 2007 to 2008, from Part B. Column 3 illustrates the ratio of the column 2 values by rating class to the decline in the S&P 500 index, also in column 2, for example  $0.436 = 16.1/37.0$ . Column 4 shows the indicated risk charge, relative to S&P index,

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column 3 times 15%, for example  $6.5\% = 0.436 \times 15\%$ .<sup>12</sup> Column 5 shows the current risk charges, for comparison.

Table 3, Part C assumes that underlying variability for SG bonds and stocks are proportional to each other, and consistent with the observed data. The assumptions underlying this calculation are highly simplified,<sup>13</sup> but we believe this approximation is more representative of the underlying market risk than the “50%” rule.

Table 3, Part C shows that, based on this analysis:

- Class 5 - the current risk charge is consistent with the indicated risk charge.
- Classes 3 and 4 - the current risk charges are somewhat low considering their 2008 experience relative to stocks.

The analysis in Table 3, Parts A-C, is based on the change in market value. However, bonds for P&C and Health companies are recorded in the Annual Statement as the lower of amortized cost or market value, and not at market value. Therefore, as market value is sometimes higher than amortized value,<sup>14</sup> there is a margin for risk already reflected in the balance sheet. The indicated risk charges in Table 3, Part C would be lower if that margin were reflected, as shown in Table 3, Part D, below.

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<sup>12</sup> This paper does not intend to address the appropriateness of the stock risk charge. Nonetheless, we note that the 2008 decline in stock values is 37%, but the risk charge is only 15%. That might appear to suggest that the 15% is ‘low.’ However, the 2008 experience might reasonably be considered a remarkably severe year, say a 1-in-100-years-or-more event, worse than the safety level implicit in the 15% risk charges, and therefore the 2008 decline in value would be larger than the risk charge.

<sup>13</sup> The calculation would be correct if the observed data were representative of the underlying risk and if the underlying risk met the following criteria: First, assume market value variation for stocks and for each type of SG bond and stocks is normally distributed, albeit but with different standard deviations. Second, assume the worst year for each asset type is a “1-in-n-year” event, with the same “n” for each asset type. Third, assume that the expected values for each asset class is proportional to the risk relativity (column 3). Then, the decline (column 2) is proportional to the number of standard deviations from the mean required to reach the “1-in-n” level of risk. The ratio in column 3 is the relative size of the standard deviations for each asset type. Since 15% for stocks is based on the number of standard deviations required for target safety level, 15% times the relative size of the standard deviations for each asset type gives the equivalent safety level for each asset type.

If the risk distribution were skew, e.g., log normal, then we would do the calculations in Table 3-C using the logarithms of the observed declines (rather than the declines themselves). The effect would be that the indicated risk charges for SG bonds would be somewhat smaller than shown.

<sup>14</sup> Table 3A ratios are higher than 100% when total market value of the assets is higher than total amortized value of the assets.

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**Table 3 – Part D**  
**SG Bond Risk Charges Based on 2008 Statement Value and Market Value Experience for Insurers’  
 Portfolios**

Current NAIC Class	(1)	(2)	(3)
	Current Risk Charge	Indications	
		Statement Value Risk (MV1A)	Market Value Risk (MV1B)
3	2.0%	6.0%	6.5%
4	4.5%	7.7%	8.0%
5	10.0%	10.9%	11.1%
S&P 500 Index	15.0%		

We show the calculation of Column 2 values in Appendix 2.

2. Bond Index Experience vs. S&P 500 Experience in the Financial Crisis Decline

In Table 4 below, we compare the worst percentage change in bond values by rating class using the bond market value index, and compare that to the worst percentage change in stock values using the S&P 500 Index.

For context, we show the results of this calculation for IG bonds as well as SG bonds, although we consider the results only for SG bonds as IG bonds are not the subject of this report. To emphasize that point, we have shaded the IG section in Table 4.

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**Table 4**  
**SG Bond Indicated Market Risk Charges Based on Financial Crisis Decline - Index Experience**  
**Market Value Indication 2 (MV 2)**

(1)	(2)	(3)	(4)	(5)	(6)
Current NAIC Class	S&P Rating Class	Financial Crisis Decline	Ratio to S&P 500	Indicated Risk Charge MV2	Current Risk Charge
1	AAA	-2.8%	0.059	0.9%	0.3%
1	AA	-6.0%	0.126	1.9%	0.3%
1	A	-2.9%	0.062	0.9%	0.3%
2	BBB	-13.5%	0.284	4.3%	1.0%
3	BB	-21.1%	0.443	6.6%	2.0%
4	B	-29.8%	0.626	9.4%	4.5%
5	CCC	-39.0%	0.820	12.3%	10.0%
6	CC	-57.9%	1.216	18.2%	30.0%
	S&P500	-47.6%	1.000	15.0%	15.0%

Data Notes:

\* Our data begins March 31, 2008 and extends to April 2018.

If we had data that began earlier than March 31, 2008, we would measure 1-year declines in market value.

Given the available data, we use short term declines for periods ending from April 1, 2008 to March 30, 2009, and annual declines for periods ending after March 30, 2009.

Specifically, for each ending date we measure the change over the shorter of the period from (a) from March 31, 2008 to the ending date or (b) from 12 months prior to the ending date.

Most, but not all, of the worst declines were in the months following March 31, 2008. For example:

The worst period for AAA bonds is the period from March 31, 2008 to June 13, 2008.

The worst period for CCC bonds is the period from March 31, 2008 to December 16, 2008.

The worst period for the S&P 500 is the period from March 31, 2008 to March 9, 2009

However, the worst year for CC bonds was 57.9%, for the year ending June 13, 2016. In the months following March 31, 2008, worst maximum declines for CC bonds was ‘only’ 52.6%.

Tax Basis Notes:

The current risk charges are on the current FIT calibration basis.

The indicated risk charges are on the current FIT calibration basis, as those risk charges are based on the current 15% stock risk charge.

For each S&P rating class, column 3 shows the financial crisis decline. Column 4 shows the ratio of the column 3 value to the column 3 value for the S&P 500 index. Column 5 shows the indicated risk charge using the 15% stock risk charge as the base, column 4 times 15%.

The assumptions in this calculation are the same as those in the Table 3 analysis.

**3. Bond Index Experience vs. S&P 500 Experience in Same Period-Standard Deviation Analysis**

In Table 5, below, column 3 shows the 10-year standard deviation for bonds in each S&P rating class and for the S&P 500. The standard deviations for a period that includes an extreme event,

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like the 2008 financial crisis, provides a broader basis for comparing market value fluctuations of SG bonds and stocks, than we obtain by considering only the most extreme period.

Using the standard deviations, we have calculated indicated market value bond risk charges shown in column 5.

The assumptions in this calculation are like those in the Table 3 analysis.

As in Table 4, for context, we show the results of this calculation for IG bonds as well as SG bonds, although we consider the results only for SG bonds, as IG bonds are not the subject of this report. To emphasize that point, we have shaded the IG section in the Table 5 below.

**Table 5**  
**SG Bond Indicated Market Risk Charges Based on 10-year Standard Deviation**  
**Market Value Indication 3 (MV 3)**

(1)	(2)	(3)	(4)	(5)	(6)
Current NAIC Class	S&P Rating Class	10 year Std Deviation	Ratio to S&P 500	Indicated Risk Charge MV3	Current Risk Charge
1	AAA	2.0%	0.133	2.0%	0.3%
1	AA	3.1%	0.209	3.1%	0.3%
1	A	4.0%	0.267	4.0%	0.3%
2	BBB	6.0%	0.403	6.0%	1.0%
3	BB	7.6%	0.509	7.6%	2.0%
4	B	8.9%	0.596	8.9%	4.5%
5	CCC	13.3%	0.887	13.3%	10.0%
6	CC	24.9%	1.660	24.9%	30.0%
	S&P 500	15.0%	1.000	15.0%	15.0%

Calculation Notes: Column 3, 10 year-standard deviation from S&P Fact sheets in April 2018.

Column 4 values are ratios of column by bond class to column S&P 500 value.

Column 5 = column (4) times 15%, the stock risk charge.

Tax Basis Notes:

The current risk charges are on the current FIT calibration basis.

The indicated risk charges are on the current FIT calibration basis, as those risk charges are based on the current 15% stock risk charge.

Data considerations

The three analyses presented above should be evaluated considering the following:

1. The results accept the current 15% stock risk charge as appropriate.

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2. Our analysis assumes that crisis data was the same “1-in-n” year event for each asset class. The data period includes the 2008 financial crisis. While it is useful to have a data set with an extreme event like that, the extreme event may not have affected all asset types equivalently.

Moreover, even if that assumption were correct for the 2008 financial crisis, this is a single extreme event and other extreme events might have different characteristics.

3. The data covers a period of only about 10 years. That is a short period for measuring variability.
4. We use Life insurer experience in methods MV1A-MV1B. The SG bonds selected by Life insurers might differ from SG bonds selected by PC/health insurers, in duration or other respects. An analysis based on PC/health insurer experience might produce different indicated risk charges.
5. As we discussed in footnote 13, we calibrate SG bond variability using the simplifying assumption that SG bond variability is proportional to stock variability at all safety levels.
6. NAIC classes 3-5 are each composed of three S&P classes, for example, class 3 includes bonds rated BB+, BB and BB-. We do not, however, have data on the distribution of bonds in the detailed class level within each NAIC class.

Item 1 creates consistency between market risk elements in the RBC formula. However, If the NAIC were to conclude the 15% risk charge should be changed, then the indicated SG risk charges would need comparable changes.

Items 2 and 3 create uncertainty, but no apparent bias towards higher or lower indications.

Item 4 suggests the MV1A-MV1B indications might be slightly ‘high’ rather than ‘low’ as Life insurers might choose SG bonds of somewhat longer duration than PC/health insurers, and longer duration SG bonds might show greater market variations than shorter duration SG bonds.<sup>15</sup>

Item 5 creates uncertainty. Overall, however, the assumption that the distributions are not skewed implies that the indications might be ‘high’ rather than ‘low.’

Item 6 affects our interpretation of the insurer experience results in MV1A and MV1B. Absent data, we need to assume a distribution of bonds by detailed S&P class to map the NAIC classes 3-

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<sup>15</sup> This directional hypothesis is less certain with respect to the financial crisis than during normal times, as interest rates fell during the crisis, and those falling rates perhaps offset, at least in part, negative market value aspects of increasing duration.

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5 into S&P classes. In the next section we consider two assumptions. We consider an “equal weighting assumption” that treats NAIC class 3 as BB bonds, as if each sub-class within BB were equally represented. We also consider an “upper bound” assumption, in which we assume class 3 is composed entirely of BB+ bonds.

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## Summary and Conclusions

Table 6, below, summarizes the indications from the different approaches.

**Table 6**  
**Summary of Indications**

Current NAIC class	S&P Rating Class	(1) Current Risk Charge	(2) - (5) Insurer Portfolio - 2008 Experience				(6) - (7) Based on Bond Index		(8) - (10) Default Risk over			(11) Tentative Proposal
			Equal Weighting		Upper Bound		Financial Crisis decline MV2	10 Yr Std Dev MV3	1 Yr	4 Yr	5 Yr	
			Statement Value Risk MV1A	Market Value Risk MV1B	Statement Value Risk MV1C	Market Value Risk MV1D						
<b>Investment Grade Bonds - Risk Charge Based Solely on Default Risk</b>												
1	AAA	0.3%					0.9%	2.0%	0.0%	0.1%	0.2%	To be determined
1	AA	0.3%					1.9%	3.1%	0.0%	0.4%	0.5%	
1	A	0.3%					0.9%	4.0%	0.2%	0.9%	1.1%	
2	BBB	1.0%					4.3%	6.0%	0.5%	1.5%	1.9%	
<b>Speculative Grade Bonds - Risk Charges Considering Market Risk</b>												
3	BB	2.0%	6.0%	6.5%	6.6%	7.0%	6.6%	7.6%	0.7%	3.2%	3.9%	6.3%
4	B	4.5%	7.7%	8.0%	8.2%	8.4%	9.4%	8.9%	1.8%	8.2%	9.7%	7.9%
5	CCC	10.0%	10.9%	11.1%	12.0%	12.1%	12.3%	13.3%	9.7%	21.6%	24.3%	11.4%
6	CC	30.0%	NA	NA	NA	NA	18.2%	24.9%				30.0%
Stocks	S&P 500	15.0%										

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Notes: Columns 2 and 3 from Table 3.

Column 4 and 5 from interpolation and extrapolation of column 2 and 3. For example, the increments from column 2 to column 4 are .55% for BB and B bonds and 1.08% for CCC bonds.

Column 6 from Table 4. Column 7 from Table 5. Columns 8-10 from Table 2.

Tax Basis Notes:

The current risk charges are on the current FIT calibration basis.

The indicated SG risk charges in columns 2-6 are on the current FIT calibration basis of the 15% stock risk charge.

The indicated SG and IG risk charges in columns 8-10 are on a BFIT basis.

The indicated IG risk charges in columns 6 and 7 are on the current FIT calibration basis of the 15% stock risk charge.

The Tentative Proposal is on the current FIT calibration basis of the 15% stock risk charge.

Our tentative proposal for IG bonds is under construction, but, as discussed in our earlier report will be based on default rates over a selected time horizon.

As in Tables 4 and 5, for context, we show the results of our market risk calculations for IG bonds as well as SG bonds, although we consider the results only for SG bonds as IG bonds are not the subject of this report. To emphasize that point, we have shaded the IG section in the Table 6.

Our tentative proposal for SG bonds, for discussion with the NAIC Drafting Group is based on the following considerations:

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1. For SG bonds, risk charges based on default rates with the 50% adjustment, in columns 6-8, differ from the risk charges based on market values, lower for NAIC class 3 and higher for NAIC class 5.

This may be the case, in part, because the default rate analysis gives little credit to the interest rates earned by SG bonds, relative to market value treatment.

In any case, as the 50% adjustment does not have a strong basis, we prefer the alternative metrics in column 2-7.

2. The risk charges in columns 2-7 have the features described in the data considerations section, and should be viewed as approximations.
3. We believe the column 2 and 4 risk charges are more relevant than the column 3 and 5 risk charges, as column 2 and 4 reflect the “lower of amortized cost or market” valuation on SG bonds.
4. Assuming we were to rely on the insurer portfolio experience, we expect that ‘equal weighting’ is “low” and “upper bound” is “high,”

For class 3-5 bonds, considering the above, we selected the values in column 11. These are the average of ‘equal weighting’ and ‘upper bound’ statement value indications from the insurer portfolio experience, in columns 2 and 4.

For class 6 bonds, S&P class CC, we see that the indicated market risk is higher than the market risk for stocks; 18.2% risk charge based on the financial market decline analysis and 24.9% based on standard deviation analysis. We also note that CC bonds had two price declines exceeding 50% in the decade beginning March 31, 2008 (see Table 4 notes). Rather than analyze the CC risk charge more deeply, we tentatively propose to leave the class 6 risk charge unchanged, at 30%.

### SG Risk Charges for 20 Proposed NAIC Risk Classes

Table 7 below shows an allocation of the rating classes in Table 6 to the 20 rating classes desired by the NAIC. In Table 7, we interpolated between major classes to obtain the ‘modifier’ class values.

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**Table 7**  
**Tentative Risk Charges with Rating Class Modifiers**

(1)	(2)	(3)	(4)	(5)	(6)
NAIC Class	Moodys Rating Class	S&P Rating Class	Current Risk Charge	Tentative Risk Charge	Notes
<b>IG Bonds - Based on Default Risk</b> (For illustration, using 4-Year Time Horizon)					
1	Aaa	AAA	0.30%	0.14%	Illustrative values for P&C companies
1	Aa1	AA+	0.30%	0.26%	
1	Aa2	AA	0.30%	0.42%	
1	Aa3	AA-	0.30%	0.59%	
1	A1	A+	0.30%	0.76%	
1	A2	A	0.30%	0.93%	
1	A3	A-	0.30%	1.09%	
2	Baa1	BBB+	1.00%	1.27%	
2	Baa2	BBB	1.00%	1.49%	
2	Baa3	BBB-	1.00%	1.80%	
<b>SG Bonds - Based on Market Risk</b>					
3	Ba1	BB+	2.00%	5.7%	Bold values from Table 6, column 11.
3	Ba2	BB	2.00%	<b>6.3%</b>	
3	Ba3	BB-	2.00%	6.8%	
4	B1	B+	4.50%	7.4%	
4	B2	B	4.50%	<b>7.9%</b>	
4	B3	B-	4.50%	9.1%	
5	Caa1	CCC+	10.00%	10.3%	Other values by interpolation
5	Caa2	CCC	10.00%	<b>11.4%</b>	
5	Caa3	CCC-	10.00%	12.6%	
6	Ca or lower	CC+ or lower		30.0%	No change

Tax basis notes:

The current risk charges are on the current FIT calibration basis.

The Illustrative IG Risk Charges are on a BFIT basis.

The Tentative SG Risk Charges are on the same FIT basis as the current 15% stock risk charge.

We note the following about the tentative risk charges in Table 7:

1. PCHWG has not finalized its recommendations regarding risk charges for IG bonds, but as it is useful see the SG bond risk charges in the context of the IG bond risk charges, we have illustrated the IG bonds risk charges using a 4-year time horizon, on a BFIT basis.

The Health IG bond risk charges may be lower than the P&C IG bond risk charges, but we intend that the SG bond risk charges would be the same for Health and P&C.

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2. The SG risk charges for BB, B and CCC bonds in Table 7 come from Table 6 column 11.
3. The SG risk charges for bonds with modifiers are based on interpolation between the bonds with modifiers.

The interpolation increment between modifier sub-classes is 0.55% between BB and B and 1.17% between B and CCC.

The BB+ to B increment is 0.55%, equal to the increment from B to BB- increment. The CCC to CCC- increment is 1.17%, equal to the CCC+ to CCC increment.

### Final Note

This report is preliminary, and our final results may vary from the values above.

## Appendix 1 - From Feldblum on Fixed Income Risk, page 303<sup>16</sup>

### *Unaffiliated Fixed Income Securities*

The major risk for fixed income securities is default risk: the risk that the issuer will not make the required interest or principal payments. The risk factor varies by the NAIC bond class (or “asset class”). The factor ranges from 0% for Treasury securities, since the default risk is virtually non-existent, to 30% for bonds in NAIC Class 6, which are primarily bonds in or near default. The full set of risk-based capital default risk factors is shown in Table 1.4

<sup>4</sup>The *NAIC Instructions*, p. 2, explain that “these bond factors are based on cash flow modeling, using historically-adjusted default rates for each bond category. For each of 2,000 trials, annual economic conditions were generated for the ten-year modeling period. Each bond of a 400-bond portfolio was annually tested for default (based on a “roll of the dice”) where the default probability varies by rating category and that year’s economic environment. When a default takes place, the actual loss considers the expected principal loss by category, the time until the sale actually occurs, and the assumed tax consequences.” (This analysis was performed by the actuarial advisory committee to the life insurance risk-based capital working group.) For investment grade bonds (Classes 1 and 2), the factors in the property/casualty risk-based capital formula are the same as those in the life insurance formula, since these bonds are reported at amortized cost by both sets of insurers. Bonds below “investment grade” (Classes 3, 4, and 5) are reported at market value in the property/casualty statutory statement but may be reported at amortized cost in the life insurance statutory statement. To use the same risk-based capital charges for the two sets of companies would amount to a double charge for property/casualty insurers. Consequently, the Class 3, 4, and 5 factors in the property/casualty formula are half as large as those in the life formula. This is the intent of the comment in the *NAIC Instructions* that “the factors for Classes 3 through 6 bonds recognize that the statement value of these bonds reflects a loss of value upon default by being marked to market.”

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<sup>16</sup> Feldblum, Sholom. “NAIC Property/Casualty Insurance Company Risk-Based Capital Requirement,” Proceedings of the Casualty Actuarial Society (PCAS) LXXXIII, 1996.

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## Appendix 2 – Calculation of Risk Charges based on Statement Value

From Life insurer Annual Statements, Schedule D, we obtain asset-by-asset fair value and carried value (which is used as a proxy for amortized value), for SG bonds by NAIC rating class, for all assets having both valuations.

From that asset-by-asset data we calculate the year-by-year total amortized value and the total of the minimum of fair value and amortized cost. We refer to the latter as the P&C and health statement value basis (PC/H statement value).

The total amortized cost provides an asset value that is not sensitive to market value changes, but it does reflect changes in assets from year-to-year. The fair value reflects changes in market values as well as changes in assets from year-to-year. We use the ratio of (a) PC/H statement value to (b) amortized value to study PC/H statement value movements between pairs of year-ends where the actual assets would likely change from year-to-year.

Table A-1, Part A, shows those ratios. Table A-1, Part B, shows the year-to-year percentage changes in those ratios from Part A. Looking at the 2007 column compared to the 2008 column, we see the decline in PC/H statement value of SG bonds relative to amortized cost. For example, for class 5 we see a decline from 96% of amortized cost in 2007 to 70% of amortized cost in 2008. Looking at the 2008 column in Part B, we see this is a 26.9% decline in value.

We also show the change in the S&P 500 index.

**Table A-1**  
**Comparison of PC/H statement value movements of SG Bonds and Stocks 2008-2017**

<b>Part A: Ratio of (a) Minimum of Fair Value and Amortized cost to (b) Amortized Costs</b>										
<b>Life Insurance Industry at Each Year-End</b>										
Designatio	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
3	97%	83%	95%	97%	96%	98%	98%	98%	95%	97%
4	95%	77%	92%	94%	96%	98%	98%	98%	92%	98%
5	96%	70%	90%	95%	93%	96%	98%	96%	94%	96%
<b>Part B: Percentage Change from Year-to-year from Part A</b>										
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
3		-14.8%	14.9%	2.2%	-0.6%	1.8%	0.1%	0.0%	-2.8%	2.0%
4		-18.9%	19.0%	2.7%	1.6%	1.8%	0.0%	0.6%	-6.0%	5.9%
5		-26.9%	28.5%	5.0%	-2.5%	3.5%	2.1%	-2.0%	-2.1%	2.4%
S&P Index		-37.0%	26.5%	15.1%	2.1%	16.0%	32.4%	13.7%	1.4%	12.0%

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**Table A-2**  
**SG Bond Risk Charges Based on 2008 Statement Value Experience for Insurers’ Portfolios**

(1)	(2)	(3)	(4)	(5)
Current NAIC Class	2008 Decline	Ratio to S&P 500	Indicated risk charge	Current Risk Charge
3	-14.8%	0.400	6.0%	2.0%
4	-18.9%	0.510	7.7%	4.5%
5	-26.9%	0.726	10.9%	10.0%
S&P 500 Index	-37.0%	1.000	15.0%	15.0%

## Appendix 3 - From Feldblum on Unaffiliated Common Stock Risk, pages 308-309<sup>17</sup>

### *Three Perspectives*

Members of three risk-based capital committees offered critiques of the 30% charge, leading to the reduction of the charge to 15% for property/casualty companies. Many regulators are uncomfortable with differing charges in the life insurance and property/casualty formulas for the same risk, and one can expect efforts in the coming years to equalize the charges in the two formulas.<sup>8</sup> The key issues involved are well represented by the following three perspectives on the common stock risk charge.

1. Robert Bailey, deputy insurance commissioner of the State of Michigan and a member of the NAIC Working Group, thought the 30% charge was too high, both for life insurers and for property/casualty insurers. However, since the life insurance risk-based capital actuarial advisory committee would not revise their 30% charge, Mr. Bailey recommended that this charge differ between life insurers and property/casualty insurers, for the following reason:

Many life insurers, especially those selling traditional whole-life insurance policies, have liabilities that are expressed in fixed dollar terms, such as \$100,000 of life insurance. For such insurance contracts, common stocks can be a risky investment, since the market value of the stocks may fluctuate while the insurance liability remains fixed. Property/casualty insurers, however, have inflation-sensitive liabilities: when inflation accelerates, the dollar amount of required liability loss reserves also increases. Property/casualty insurers may use inflation- sensitive liabilities.<sup>9</sup>

2. William Panning (Hartford) and Peter Storms (Travelers), members of the Accounting Advisory Committee to the NAIC Working Group, reexamined the work of the life insurance risk-based capital actuarial advisory committee on common stock risks, using different investment years and different holding periods. Using 90% and 95% confidence intervals, they concluded that the 30% charge was excessive; a more appropriate number would be between 10% and 12%.
3. Robert Butsic of the Fireman’s Fund Insurance Companies, a member of the AAA RBC Task Force, calibrated the common stock charge using a 1% “expected policyholder deficit.” He also concluded that the 30% charge was excessive, and that a more appropriate number would be 15%.<sup>10</sup>

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<sup>17</sup> Feldblum, Sholom. “NAIC Property/Casualty Insurance Company Risk-Based Capital Requirement,” Proceedings of the Casualty Actuarial Society (PCAS) LXXXIII, 1996.

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FOOTNOTES:

<sup>8</sup>During late 1993, for instance, consideration was given to reducing the common stock charge in the life insurance risk-based capital formula as well. In early 1994, however, the life insurance actuarial advisory committee to the NAIC Working Group again concluded that 30% is an appropriate charge, and it should not be reduced to 15%.

<sup>9</sup>On the inflation sensitivity of property/casualty loss reserves, see Butsic [10]. The inflation sensitivity of common stocks is a much debated issue; see Fama and Schwert [18] and Feldblum [19]. Bailey’s position is best summed up in his July 6, 1992, letter to Sholom Feldblum: “I supported a lower RBC charge for common stocks for casualty insurers on the theoretical grounds that casualty insurers have a greater proportion of their liabilities that are inflation-sensitive and therefore need more assets that are inflation sensitive in the same direction.”

<sup>10</sup>Butsic chose a 1% “expected policyholder deficit” (EPD) ratio because the reserving risk charges in the risk-based capital formula, when viewed from an expected policyholder deficit perspective, produce an expected policyholder deficit ratio of about 1%. See Butsic [11] for a discussion of the expected policyholder deficit concept and its application to risk-based capital requirements. Butsic argues that the various components of the risk-based capital formula should be internally consistent: each should be calibrated to approximately the same “solvency” level. With regard to the Accounting Advisory Committee comments on the “holding period,” see Butsic’s Exhibit 4 and the related text regarding the “time horizon” for the risk-based capital system. For common stock investments and casualty loss reserves, the longer the time horizon, the greater the capital needed to satisfy a given EPD ratio.

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## Appendix 4 – Rating Class Definitions

Row #	Current NAIC	Bloomberg	MOODY'S	S&P	FITCH	DBRS
1	1	AAA	Aaa	AAA	AAA	AA
2	1	AA+	Aa1	AA+	AA+	AA high
3	1	AA	Aa2	AA	AA	AA
4	1	AA-	Aa3	AA-	AA-	AA low
5	1	A+	A1	A+	A+	A high
6	1	A	A2	A	A	A
7	1	A-	A3	A-	A-	A low
8	2	BBB+	Baa1	BBB+	BBB+	BBB high
9	2	BBB	Baa2	BBB	BBB	BBB
10	2	BBB-	Baa3	BBB-	BBB-	BBB low
11	3	BB+	Ba1	BB+	BB+	BB high
12	3	BB	Ba2	BB	BB	BB
13	3	BB-	Ba3	BB-	BB-	BB low
14	4	B+	B1	B+	B+	B high
15	4	B	B2	B	B	B
16	4	B-	B3	B-	B-	B low
17	5	CCC+	Caa1	CCC+	CCC+	CCC high
18	5	CCC	Caa2	CCC	CCC	CCC
19	5	CCC-	Caa3	CCC-	CCC-	CCC low
20	6	CC	Ca	CC	CC	CC
21	6	C	C	C	C	C
22	6	D	D			