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Proposed NAIC RBC C1 Factors for Life Insurers: Impact on Portfolio Optimization?

By Mark Yu and Tobias Gummersbach

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T his issue of *Perspectives* highlights the differences between the current and proposed C1 factors.

The National Association of Insurance Commissioners (NAIC) presented a proposal of new risk-based capital (RBC) charges for C1 investment risk in 2015. This proposal also introduced additional granularity of fixed income credit rating reporting, from six to twenty categories. Although the current proposal focuses on life insurers, NAIC has stated that the proposed structure of twenty rating categories would also apply to health, and property and casualty insurers. The numeric values of the respective C1 factors might vary by industry segments.

These proposed capital charges are developed based on the historical default probability and loss recovery experiences of corporate bonds; however, they will apply to other fixed income securities including municipal bonds, structured securities[1] and private placements. In addition to these base C1 factors, there will be portfolio adjustments to reflect company-specific portfolio characteristics to help ensure that the statistical safety level (i.e., confidence level) for the C1 component is met. Our case study focuses on the base C1 factor without applying company-specific portfolio adjustments.

This issue of *Perspectives* highlights the differences between the current and proposed C1 factors. The portfolio optimization case study then utilizes the U.S. life industry data to illustrate key differences between optimized portfolios under current and proposed C1 factors.

Our analysis includes these key takeaways:

1. Proposed C1 factors reflect the underlying default risk more appropriately than current C1 factors and might affect insurers' asset allocations.

2. Portfolio optimization needs to evaluate the "risk-adjusted returns" of various asset classes along with their respective C1 charges. Use of marked-to-market metrics (Value-at-Risk or VaR) might yield different optimization outcomes.

3. Portfolio optimization studies indicate that the proposed C1 factors would result in further duration extension to achieve similar income returns, due to distinct C1 factors at more granular credit rating levels.

4. Under the proposed C1, portfolio optimization with duration constraints may favor structured securities as these tend to have high credit qualities and short durations.

NAIC RBC C1 CAPITAL CHARGES: CURRENT VS. PROPOSED
Table 1
Proposed Credit Rating Granularity and Capital Charges

Bond Rating	Current Category	Proposed Category	After-Tax		
			Current Factors	Proposed Factors	Percent Difference
Aaa	NAIC1	1-A	0.30%	0.21%	-30%
Aa1		1-B	0.30%	0.32%	7%
Aa2		1-C	0.30%	0.46%	54%
Aa3		1-D	0.30%	0.57%	93%
A1		1-E	0.30%	0.70%	136%
A2		1-F	0.30%	0.82%	177%
A3		1-G	0.30%	0.94%	219%
Baa1	NAIC2	2-A	0.96%	1.07%	12%
Baa2		2-B	0.96%	1.21%	26%
Baa3		2-C	0.96%	1.45%	51%
Ba1	NAIC3	3-A	3.39%	2.56%	-25%
Ba2		3-B	3.39%	3.16%	-7%
Ba3		3-C	3.39%	4.05%	19%
B1	NAIC4	4-A	7.38%	4.32%	-41%
B2		4-B	7.38%	5.66%	-23%
B3		4-C	7.38%	7.42%	1%
Caa1	NAIC5	5-A	16.96%	10.40%	-39%
Caa2		5-B	16.96%	14.29%	-16%
Caa3		5-C	16.96%	21.46%	27%
Below Caa3	NAIC6	6-A	19.50%	19.50%	0%
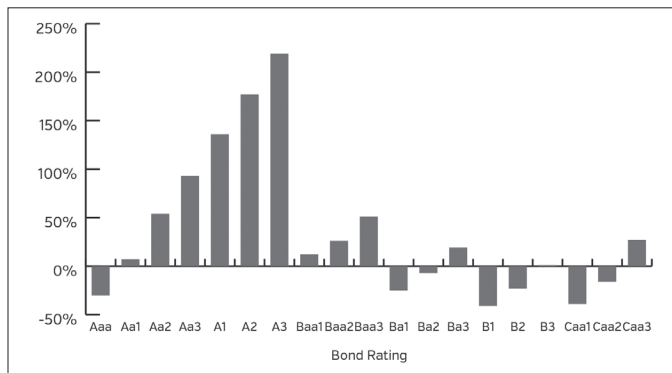
Source (for Table 1 and Chart 1): Model construction and development of RBC factors for fixed income securities for the NAIC's life RBC formula - American Academy of Actuaries, August 2015

Table 1 shows how the current C1 and proposed C1 charges have expanded from six to twenty rating categories. The current Baa3 C1 charge (0.96%) is 3.25 times the Aaa C1 charge (0.30%), while under the proposed C1 factors that multiple increases to more than seven times (1.45% vs. 0.21%). The proposed C1 factors distinguish the underlying default risk at more granular rating levels.

Chart 1 demonstrates the percentage differences between current versus proposed C1 charges. The single "A" category shows the most increases, while several lower credit rating categories reflect reduced charges. Without additional analysis, these varying levels of relative changes across rating categories might suggest benefits that may be derived from replacing single "A" securities with those of lower credit quality.

PORTFOLIO OPTIMIZATION CASE STUDY - INITIALIZATION

A portfolio optimization framework evaluates return and risk tradeoffs among different asset classes and identifies portfolio configurations that are optimal (or more efficient) in terms of selected return and risk metrics.

Under the NAIC statutory accounting framework, life insurers typically focus on enhancing book yields (income return) while targeting certain capital ratios or liquidity scores. The risk tolerance metrics used vary by company, depending on the enterprise objectives and stakeholders' expectations. In this issue of *Perspectives*, our portfolio optimization is configured *to maximize the book yield at given levels of volatility while maintaining similar levels of NAIC RBC capital charges.* The goal of our optimization is to identify key directional differences between the optimized allocations, based on current versus proposed C1 charges.

For this portfolio optimization review, we use U.S. life industry 2015 year-end reported statutory financials, investment holdings, and generic product and liability assumptions for an Enterprise Based Asset Allocation (EBAA).[2] The EBAA starts with a breakdown of the return on equity (ROE) of a life insurance enterprise:

$$\text{Return on Equity} = \frac{\text{Earnings}}{\text{Equity}} = \frac{\text{Assets Return} - \text{Liabilities Return}}{\text{Equity}}$$

$$= \left(\frac{\text{Assets}}{\text{Equity}} \times \frac{\text{Return on Assets}}{} \right) - \left(\frac{\text{Liabilities}}{\text{Equity}} \times \frac{\text{Return on Liabilities}}{} \right)$$

Table 2
U.S. Life Industry Return-on-Equity Components and Assumptions

Components and Assumptions	
Investment Leverage (Assets/Equity)	9.1
Product Leverage (Liability/Equity)	7.5
Total Return on Assets	4.8%
Total Return on Liabilities	4.1%
Return on Equity (Pre-Tax)	12.2%

Source: NEAM, SNL

Table 2 highlights key components and contributions of ROE for the U.S. life industry. The investment and product leverage are based on 2015 year-end reported industry balance sheet financials. Total return of liabilities assumes a representative life and annuity business mix, with appropriate return and volatility assumptions. The return on assets reflects both the income return of fixed income securities and total return of equity-like assets in the investment portfolio outlined in Table 3 (see next page).

Table 3 summarizes the asset classes that are included in the EBAA process. Given that the focus of our optimization review is to evaluate the impact of proposed C1 factors on the fixed income portfolio allocation, we exclude cash and short-term holdings, contract loans, real estate and derivatives from the life industry's invested assets. Moreover, allocations to commercial mortgage loans (12.1%), equity (1.2%), and alternative investments (5.2%) are maintained at current levels throughout the optimization process.

> Proposed C1 factors reflect the underlying default risk more appropriately than current C1 factors.

Table 3
U.S. Life Industry Investment Portfolio Sector Allocation

| Asset Class	Percent
U.S. Government/Agency	7.2%
Public Invest Grd Corp & Taxable Muni	40.1%
Municipal - Tax Exempt	0.9%
Private Placements	13.9%
High Yield	3.2%
Structured Securities	16.4%
Commercial Mortgage Loans	12.1%
Equity (Unaffiliated common/preferred)	1.2%
Alternatives	5.2%
Total	100%

Source: NEAM, SNL

PORTFOLIO OPTIMIZATION CASE STUDY – RESULTS AND IMPLICATIONS

With the initial life industry portfolio established, the following EBAA optimization review takes several sequential steps:

1. Optimize the portfolio *to maximize the book yield (income return) while maintaining the initial C1 charges*

2. Establish the optimal asset allocations under current and proposed C1 capital charges separately

3. Evaluate the impact of duration constraints on the optimization results

4. Identify key directional differences between the optimized allocations based on current and proposed C1 charges

Chart 2
Efficient Frontiers Comparison: Current vs. Proposed C1
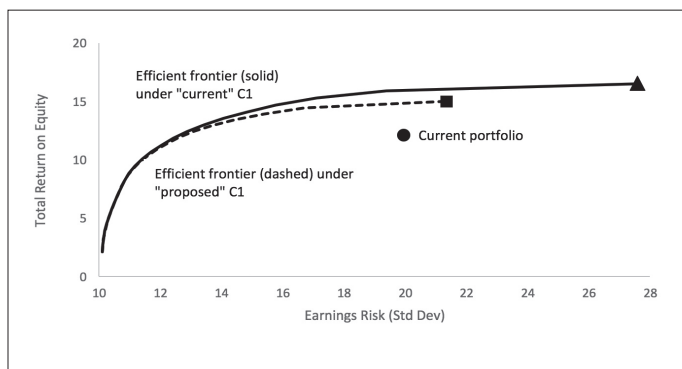
Source: NEAM

Chart 2 compares two efficient frontiers, both maximizing the income return while maintaining the initial level of C1 charges. The solid efficient frontier uses current C1 factors, while the dashed uses the proposed C1 factors. At first glance, the solid efficient frontier "trumps" the dashed efficient frontier, as points on the solid curve have better risk-adjusted returns than points on the dashed curve. But, all might not be what it initially appears.

Table 4
Baseline Optimal Portfolio Configuration Based on Current and Proposed C1

	Current Portfolio (Circle Dot)	Current C1 Maximize BY (Triangle Dot)	Proposed C1 Maximize BY (Square Dot)
Enterprise Statistics			
Total Return on Equity	12.13	16.51	14.98
Earnings Risk (Std Dev)	19.94	27.60	21.35
99.50 VAR % Capital	45.3	**63.0**	**46.9**
Total Return on Assets	4.77	5.25	5.08
Investment Leverage	9.06	9.06	9.06
Product Leverage	7.52	7.52	7.52
Product Margin	(4.13)	(4.13)	(4.13)
Additional Return/Risk Metrics			
Current RBC C1 ($)	**6,638**	**6,638**	6,329
Proposed RBC C1 ($)	**7,028**	7,425	**7,028**
Book Yield (BY)	4.80	**5.33**	**5.15**
Market Yield (OAY)	3.99	4.72	4.38
Duration (OAD)	6.73	9.04	8.48

Source: NEAM

Table 4 provides the key return and risk metrics of the current portfolio (circle dot) and the triangle and square dots (portfolios) along the two efficient frontiers in Chart 2. The triangle dot represents the portfolio on the efficient frontier that maximizes book yield (income return) at the current C1 level ($6,638). Similarly, the square dot represents the portfolio on the efficient frontier that maximizes book yield (income return) at the proposed C1 level ($7,028). The triangle dot

> ## Although both optimal portfolios achieve the same book yields, they have different risk profiles.

portfolio offers a higher book yield (5.33%) compared to the square dot portfolio (5.15%). However, when evaluated under an economic, marked-to-market framework where VaR is used as the risk metric, the triangle dot portfolio's VaR (63%) is significantly higher than the square dot portfolio's (46.9%). We need to establish a common metric, either return or risk, to achieve meaningful comparisons. Table 5 displays an approach for these comparisons (see next page).

The circle and square dot portfolios in Table 5 are the same as those in Table 4, except with additional sector and credit rating distributions. The triangle dot portfolio in Table 5 represents a different point along the solid efficient frontier that provides the identical book yield (5.15%) as that of the square dot portfolio. Both the triangle and square dot portfolios are from efficient frontiers and therefore are more "optimal" than the circle dot current portfolio (see Chart 3).

Optimized under current C1, triangle dot portfolio's enhanced risk-adjusted return is achieved through credit rotation or arbitrage (swapping AAA and AA with A, as all currently have the

same C1 capital charges) and duration extension (from 6.73 to 7.92). The square dot represents optimization under the proposed C1 and exhibits similar directional reconfigurations in terms of credit, sector and duration; however, the degrees of these rotations differ from the triangle dot.

Although the triangle dot and square dot achieve the same book yield, they have different risk profiles. The square dot has a better average credit quality (A vs. A-), but longer duration (8.48 vs. 7.92); it also has higher economic tail risk (VaR of 46.9% vs. 33.3% from the triangle dot). Next, we focus on constraining durations.

Chart 3
Efficient Frontiers Comparison: Current vs. Proposed C1 – Targeting a Relative Book Yield of 5.15%
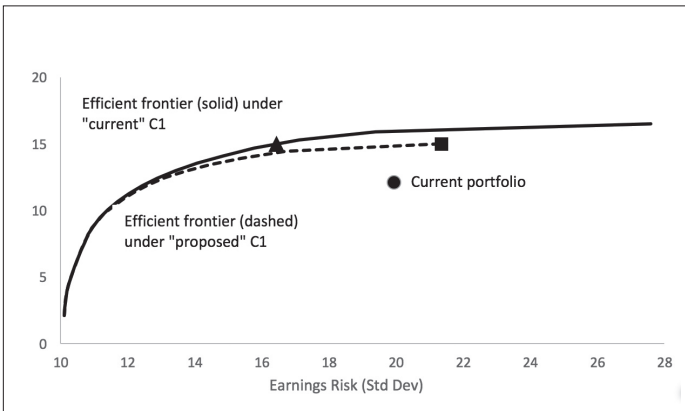
Source: NEAM

Table 5
Optimal Portfolio Configuration Based on Current and Proposed C1 –Targeting a Relative Book Yield of 5.15%

	Current Portfolio (Circle Dot)	Current C1 Maximize BY (Triangle Dot)	Proposed C1 Maximize BY (Square Dot)
Enterprise Statistics			
Total Return on Equity	12.13	14.98	14.98
Earnings Risk (Std Dev)	19.94	16.44	21.35
99.50 VAR % Capital	45.3	**33.3**	**46.9**
Total Return on Assets	4.77	5.08	5.08
Investment Leverage	9.06	9.06	9.06
Product Leverage	7.52	7.52	7.52
Product Margin	(4.13)	(4.13)	(4.13)
Additional Return/Risk Metrics			
Current RBC C1 ($)	**6,638**	**6,638**	6,329
Proposed RBC C1 ($)	**7,028**	7,314	**7,028**
Duration (OAD)	**6.73**	**7.92**	**8.48**
Book Yield	4.80	**5.15**	**5.15**
Market Yield (OAY)	3.99	4.35	4.38
Default Loss ($)	412	537	493
Quality Distribution (%)			
Average Rating	A	A-	A
AAA	7.8	7.3	7.3
AA	21.5	15.0	18.3
A	21.2	33.2	30.4
BBB	38.6	32.3	34.2
<BBB	4.8	6.3	3.9
Non-FI	6.0	6.0	6.0
Total	100	100	100
Sector Distribution (%)			
U.S. Gov't / Agncy	7.2	6.1	5.5
Public InvGrd Credit	40.1	44.8	43.5
Muni - Tax Exempt	0.9	0.9	0.6
Private Placement	13.9	13.9	13.9
High Yield	3.2	4.6	2.2
Structured Sec.	16.4	**11.3**	**15.9**
Comml Mortgage	12.1	**12.1**	**12.1**
Equity	1.2	1.2	1.2
Alternative	5.2	5.2	5.2
Total	**100.0**	**100.0**	**100.0**

Table 6
Optimal Portfolio Configuration Based on Current and Proposed C1 –Where the Duration Remains Constant

	Current Portfolio (Circle Dot)	Current C1 Maximize BY (Triangle Dot)	Proposed C1 Maximize BY (Square Dot)
Enterprise Statistics			
Total Return on Equity	12.13	15.05	14.16
Earnings Risk (Std Dev)	19.94	20.29	22.06
99.50 VAR % Capital	45.32	43.87	49.52
Total Return on Assets	4.77	5.09	4.99
Investment Leverage	9.06	9.06	9.06
Product Leverage	7.52	7.52	7.52
Product Margin	(4.13)	(4.13)	(4.13)
Additional Return/Risk Metrics			
Current RBC C1 ($)	**6,638**	**6,638**	6,582
Proposed RBC C1 ($)	**7,028**	7,269	**7,028**
Duration (OAD)	**6.73**	**6.73**	**6.73**
Book Yield	4.80	**5.16**	**5.05**
Market Yield (OAY)	3.99	4.29	4.18
Default Loss ($)	412	485	480
Quality Distribution (%)			
Average Rating	A	A-	A
AAA	7.8	6.7	15.4
AA	21.5	17.6	19.3
A	21.2	26.2	17.8
BBB	38.6	38.9	36.9
<BBB	4.8	4.6	4.6
Non-FI	6.0	6.0	6.0
Total	100	100	10
Sector Distribution (%)			
U.S. Gov't / Agncy	7.2	3.4	4.9
Public InvGrd Credit	40.1	**44.8**	**34.9**
Muni - Tax Exempt	0.9	0.4	0.9
Private Placement	13.9	13.9	13.9
High Yield	3.2	3.0	3.0
Structured Sec.	16.4	**16.1**	**24.0**
Comml Mortgage	12.1	12.1	12.1
Equity	1.2	1.2	1.2
Alternative	5.2	5.2	5.2
Total	**100.0**	**100.0**	**100.0**

Chart 4
Efficient Frontiers Comparison: Current vs. Proposed C1 –
Where the Duration Remains Constant
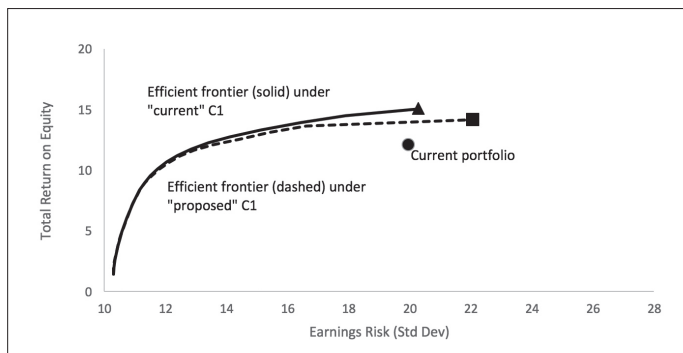
Source: NEAM

Life insurers traditionally target their asset duration at certain levels based on their liability profile. Here, we impose duration constraints on the earlier developed optimizations and the resulting efficient frontiers are shown in Chart 4. The triangle and square dots in Chart 4 correspond to those in Chart 2, but are constrained by the initial duration level (6.73). As expected, the additional duration constraint reduced the maximum achievable book yield under both current and proposed C1: 5.33% to 5.16% under current C1 and 5.15% to 5.05% under proposed C1.

The duration constraint significantly alters the optimal asset allocation. From a credit standpoint, among AAA, AA and A rating categories (current NAIC 1 category), the square dot, relative to the triangle dot, favors AAA and AA over A; and BBB allocation is actually reduced. This credit rotation is contrary to the common rationale suggested by Chart 1, which implies that single A's will be replaced by lower-rated fixed income securities. Thus, the *relative risk-adjusted return matters, not just the changes in relative capital charges.* From an asset sector perspective, structured securities are favored under proposed C1 as they tend to have high credit qualities and short durations.

CONCLUDING REMARKS

The NAIC's Life RBC proposal presents new C1 factors for fixed income securities and also expands the credit rating reporting from six to twenty categories. The proposed structure of twenty rating categories will apply to health, and property and casualty insurers, although the numeric C1 factors might vary by industry segments.

The proposed C1 factors are likely to *incentivize* life insurers to reconfigure their investment portfolio. To achieve a similar book yield from the fixed income portfolio will require extending the duration under the proposed C1 optimization. This is because the proposed C1 charges remove the credit arbitrage incentives that exist in the current RBC framework.

When duration is constrained, optimization under the proposed C1 framework will favor higher (AAA and AA) over lower (A or BBB) credit quality. Thus, under the new RBC framework, structured securities, which tend to have high credit quality and short duration, could be the winners.

We welcome your feedback and comments. Please contact us if you would like to know more about the implications that current and proposed RBC C1 charges will have for the life insurance industry and, more specifically, to your business.

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Mark Yu is an enterprise risk and capital management professional with NEAM. He can be contacted at *mark.yu@neamgroup.com.*

Tobias Gummersbach is an enterprise risk and capital management professional with NEAM. He can contacted at *tobias.gummersbach@ neamgroup.com.*

ENDNOTES

1 Structured securities will follow a two-step process. Initially, NAIC will stay with the current modeling process, but map the breakpoint price to twenty factors rather than the current six factors. The second step will be to review the entire process for establishing appropriate capital requirements for structured securities.

2 Refer to NEAM's June 2016 Perspectives – Life Insurer Asset Optimization: A Top-Down Enterprise Approach