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May 8, 2019

Tom Botsko, Chair
Property and Casualty Risk-Based Capital Working Group
National Association of Insurance Commissioners
(via email to Eva Yeung)

Dear Tom:

The American Academy of Actuaries[1] Property and Casualty Risk-Based Capital (RBC)
Committee plans to support the National Association of Insurance Commissioners'
efforts to update the calibration of factors used to calculate underwriting (UW) risk. This
letter describes our plans. We appreciate this opportunity to describe those plans and
solicit input from the NAIC Property and Casualty RBC Working Group.

1. Overview

We plan to analyze the following:

- Investment Income Adjustment (IIA)—RBC Line 8 on page PR017 (R4 Reserve
  risk) and Line 7 on page PR018 (R5 Premium risk), by Line of Business (LOB);

- Loss Concentration Factor (LCF) and Premium Concentration Factor (PCF)—
  RBC Line 14 on PR017 and PR018 respectively, which are used to calculate
  diversification credit in the RBC Formula; and

- LOB UW risk factors—RBC Line 4 on PR017 and PR018. We will use the results
  of this review as a starting point for the IIA and LCF/PCF analysis. This review
  will include the use of data not available to this Academy committee at the time
  the 2016 Academy Report[2] was provided.

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[1] The American Academy of Actuaries is a 19,500-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
policy makers 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.

[2] Report to National Association of Insurance Commissioners Property/Casualty Risk-Based Capital (E)
Working Group: 2016 Update to Property and Casualty Risk-Based Capital Underwriting Factors,
American Academy of Actuaries Property and Casualty Risk-Based Capital Committee, October 2016.

The remainder of this letter provides more details regarding our proposed analyses.

2. IIA Analysis (Line 8/7)

The IIA reduces the amount of UW risk charge to recognize that future investment income will be available to offset the cost of adverse UW (premium risk) or reserve development (reserve risk).

Evaluation approach

The IIAs are based on a 5% per annum interest rate assumption, which is not consistent with recent experience.

We will consider two ways to update the IIAs. First, the Line 4 risk factor and the IIA on Lines 8/7 are currently calibrated as independent parameters. We use the term Nominal Value Approach (NVA) to describe an approach that does not consider possible interactions between interest rates underlying the IIA and loss experience underlying the Line 4 risk factors.

Implementing NVA requires changing the IIAs to reflect changing interest rates over time. We will consider how that might be done in a manner that provides reasonable stability but remains responsive to current conditions.

Second, we note that there are reasons to expect that loss ratios (LRs) and reserve runoff ratios (RRRs) are higher when interest rates are higher.[3] An alternative to NVA, which considers a possible interaction between UW risk and interest rates, is to calibrate UW risk factors (Line 4) using data discounted to present value based on historical interest rates. Risk factors and IIAs can be developed from that analysis. We refer to that alternative as the Present Value Approach (PVA).

With PVA, we would establish the combined effect of the underwriting risk factors (Line 4) and the IIA (Line 8/7). We would produce a single indicated risk factor that reflects both UW risk, Line 4, and IIA, Lines 8/7. If desired, for consistency with the current format of the RBC Formula, that combined risk factor can be split into its two components. However, future changes in interest rates will not necessarily require changes in the IIA values.

We plan to prepare indications for IIAs based on both NVA and PVA.

Interaction with UW risk safety level

Consistent with prior calibrations, UW risk factor Line 4 calibrations prepared for the NAIC in the 2016 Report are based on an 87.5th percentile safety level. We understand

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[3] An observation in the 1993 Report on Reserve and Underwriting Risk Factors by the American Academy of Actuaries Property/Casualty Risk-Based Capital Task Force, and more recently, Casualty Actuarial Society Dependency and Calibration Working Party Report 15. Publication in CAS EForum is pending.

the 87.5th percentile is used because it appeared to be consistent with the UW risk safety level selected when the RBC Formula was first calibrated in the early 1990s.

The 5% interest rate was also selected in the initial RBC calibration in the early 1990s. At that time actual interest rates were higher than 5%. Therefore, the initial IIA calibration can be viewed as including an implicit interest rate safety margin—that being the difference between actual interest rates at the time and the 5% interest rate selected.

In the IIA analysis, we will use interest rates with and without the kind of implicit safety margin that was part of the RBC calibration in the early 1990s. In using interest rates with no implicit safety margin we will consider the extent to which the UW risk safety level should be increased to a value above 87.5%, to reflect the combination of the current 87.5th percentile on UW risk and any implicit interest rate safety margin. We will provide the NAIC with alternative treatments on this issue.

3. LCF/PCF Analysis (Line 14)

The LCF/PCF uses the ratio of the reserve/premium amount for the company's largest RBC LOB to the company's all-lines total reserve/premium amount. This ratio is used to measure the spread of business by LOB, commonly called diversification. We refer to that ratio as the Company Line of Business Maximum% (CoMaxLine%).

The LCF/PCF equals CoMaxLine% times 0.3 plus 0.7. This produces a discount for diversification, up to a maximum somewhat less than 30%.[4]

Evaluation of 30% Maximum Diversification Credit

The proposed work will review the extent to which the 30% maximum should be revised based on experience.

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[4] The maximum credit would be 30% if the number of LOBs were infinite. If premium/reserves were divided equally among the 19 LOBs, CoMaxLine% is 1/19, 5.26%, and the maximum credit is 28.4%.

Evaluation of other approaches

There are alternatives to the CoMaxLine% Approach in the RBC formula. One alternative approach is to use the largest LOB risk amount, rather than the largest reserve/premium amount. We refer to this as the CoMaxLine%-Risk approach.[5,6]

Another alternative approach to evaluating diversification could be based on the Herfendahl-Hirschman Index (HHI). HHI is widely used by economists to measure concentration. The HHI index considers the relative proportions of all LOBs (largest, second-largest, third-largest, etc.) [7], whereas the CoMaxLine% approach only considers the relative proportion of the largest LOB.

We will evaluate these alternatives.

4. Update to UW factors

The UW factors presented in the 2016 Report are based on data for Annual Statement years 1997–2014. For this work, the NAIC has provided data for Annual Statement years 1984[8]–2017. We plan to update UW factors to include the additional new years (2015–2017), and we will potentially use data from Annual Statement years prior to 1997 for specific LOBs.

Our indicated risk factors will include the effect of catastrophe events, net of reinsurance. We expect that the NAIC will continue to apply its current catastrophe adjustment

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[5] As an example of the difference between the risk maximum and the premium/reserve (volume) maximum, consider a hypothetical company that had $1 million of private passenger liability premium and $1 million of occurrence medical malpractice premium.

  The private passenger automobile risk premium charge is about 15% and malpractice occurrence premium risk charge is about 60%, producing $150,000 of automobile premium risk, $600,000 of medical malpractice premium risk, and $750,000 in total premium risk (before diversification).

  Using the CoMaxLine% approach in the RBC Formula, the CoMaxLine% is 0.50, and the credit for spread of business is 15%, half of the 30% maximum credit.

  Based on risk, the maximum risk is the $600,000 for occurrence medical malpractice and the CoMaxLine%-Risk is 0.80 (600,000/750,000). The CoMaxLine%-Risk is much higher than CoMaxLine% because from the risk perspective the company is much less diversified. Measured this way, the credit for spread of business is reduced to 6%.

[6] Using risk by LOB suggests the use of expenses by LOB. Expenses by LOB for the current year are in the Insurance Expense Exhibit, which is not filed until a month after the Annual Statement is filed. We will test options that use data that is available when the Annual Statement is filed, e.g., current year total expenses allocated by LOB based on prior year expenses by LOB, prior year expense by LOB with no adjustment to the current year, and current year company-wide expenses that does not vary by LOB.

[7] HHI equals the sum of the squares of the relative proportions of each LOB compared to the total.

  For example, if there is only one LOB, HHI is 1.0, as is the case for the CoMaxLine%. With two lines split 50% and 50% HHI and the CoMaxLine% are still the same, both 0.5.

  With two lines split 25% and 75% HHI is 0.25^2 plus 0.75^2 or 0.625 compared to the CoMaxLine% of 0.750, i.e., HHI shows more diversification. With three lines split 50%, 25% and 25% HHI is 0.50^2 plus 0.25^2 plus 0.25^2 or 0.375, more diversification than the CoMaxLine% of 0.5.

  The HHI is sometimes applied to only the n-th largest segments, e.g., the degree of diversification among the top five or 10 LOBs.

[8] Annual Statements 1989 and subsequent for reserve risk data.

process to any updated UW risk factors it may choose to implement based on the results of our analysis.[9]

5. Timeline

NAIC staff have provided us with much of the necessary data. We greatly appreciate that assistance, without which this project would not be possible.

We are currently reviewing the data and organizing it for our analyses.

We will provide a timeline and milestones at future meetings and calls.

6. Directional Impacts of These Analyses on RBC Formula Values

While we currently have no results, based on the nature of the changes, we expect that:

- The IIA revision will indicate an increase in amount of UW risk charges for all companies; and

- The LCF/PCF analysis will generally indicate a decrease in amount of UW risk charges for diversified companies.

We expect to provide possible transition rules for implementation, consistent with past practice and/or if such rules appear warranted by features in the data.

Also, as we have in the past, we will ask NAIC to do an impact review of indicated changes.

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We appreciate this opportunity to assist the NAIC.

Regards,

Lauren Cavanaugh
Chairperson
Academy Property &Casualty
Risk-Based Capital Committee

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[9] The Academy P&C RBC Committee would be happy to discuss how we might assist the NAIC in calibration of the risk factors on a net-of-catastrophe basis, but we believe that should be a separate project, after we complete the projects we describe in this letter.

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