Draft date: 2/18/26

2026 Spring National Meeting
San Diego, California

JOINT MEETING OF THE PROPERTY AND CASUALTY RISK-BASED CAPITAL (E) WORKING GROUP AND CATASTROPHE RISK (E) SUBGROUP
Monday, March 23, 2026
10:30 – 11:30 a.m.
Manchester Grand Hyatt—Grand Hall B—Level 1

ROLL CALL

PROPERTY AND CASUALTY RISK-BASED CAPITAL (E) WORKING GROUP

Tom Botsko, Chair	Ohio	Melissa Robertson	New Mexico
Wanchin Chou, Vice Chair	Connecticut	Ni Qin	New York
Charles Hale	Alabama	Will Davis	South Carolina
Rolf Kaumann/Eric Unger	Colorado	Rebecca Armon	Texas
Jane Nelson	Florida	Adrian Jaramillo	Wisconsin
Sandra Darby	Maine		

NAIC Committee Support: Eva Yeung/Maggie Chang

CATASTROPHE RISK (E) SUBGROUP

Wanchin Chou, Chair	Connecticut	Alexander Vajda	New York
Jane Nelson, Vice Chair	Florida	Tom Botsko	Ohio
Rolf Kaumann/Eric Unger	Colorado	Andy Schallhorn	Oklahoma
Travis Grassel	Iowa	Will Davis	South Carolina
Sandra Darby	Maine	Rebecca Armon	Texas
Melissa Robertson/Elouisa Tyler	New Mexico		

NAIC Committee Support: Eva Yeung

AGENDA

1. Consider Adoption of the Joint Property and Casualty Risk-Based Capital (E) Working Group and Catastrophe Risk (E) Subgroup's Jan. 28, 2026, and Nov. 12, 2025, Minutes—*Tom Botsko (OH)* — Attachment One, Attachment Two

2. Consider Adoption of Proposal 2025-19-CR (Separating Earthquake and Hurricane Lines Experience Data in PR100s)—*Wanchin Chou (CT)* — Attachment Three

3. Consider Adoption of Proposal 2025-20-CR (Wildfire Rcat Implementation)—*Wanchin Chou (CT)* — Attachment Four

4. Condsider Exposure of Proposal 2026-08-CR (PR027INT Item D Modification)—*Wanchin Chou (CT)* — Attachment Five

5. Hear Updates on the Severe Convective Storms Impact Analysis —*Wanchin Chou (CT)*

6. Discuss Climate Impact Disclosures—*Wanchin Chou (CT)*

7. Discuss Flood Peril—*Wanchin Chou (CT)*

8. Receive an Update from the Health Risk-Based Capital (E) Working Group Regarding Proposal 2025-15-CA (A&H Underwriting Risk Structure Change)—*Steve Drutz (WA)* — Attachment Six

9. Discuss the Property and Casualty (P/C) Risk-Based Capital (RBC) Premium and Loss Concentration Factors—*Tom Botsko (OH)* — Attachment Seven

10. Discuss Any Other Matters Brought Before the Working Group and Subgroup—*Tom Botsko (OH)*

11. Adjournment

Draft: 2/4/26

Property and Casualty Risk-Based Capital (E) Working Group
and Catastrophe Risk (E) Subgroup
E-Vote
January 28, 2026

The Property and Casualty Risk-Based Capital (E) Working Group of the Capital Adequacy (E) Task Force conducted an e-vote with the Catastrophe Risk (E) Subgroup of the Property and Casualty Risk-Based Capital (E) Working Group that concluded Jan. 28, 2026. The following Working Group members participated: Tom Botsko, Chair (OH); Wanchin Chou, Vice Chair (CT); Charles Hale (AL); Eric Unger (CO); Travis Grassel (IA); Sandra Darby (ME); Ni Qin (NY); and Will Davis (SC). The following Subgroup members participated: Wanchin Chou, Chair (CT); Charles Hale (AL); Eric Unger (CO); Sandra Darby (ME); Alexander Vajda (NY); Tom Botsko (OH); and Andy Schallhorn (OK).

1. Adopted the Updated 2025 U.S. and Non-U.S. Catastrophe Risk Event Lists

The Working Group and Subgroup conducted an e-vote to consider adoption of proposal 2025-08-CR (2025 U.S. and Non-U.S. Catastrophe Risk Event Lists).

Grassel made a motion, seconded by Darby, to adopt the 2025 U.S. and non-U.S. catastrophe risk event lists (Attachment XX-A). The motion passed unanimously.

Having no further business, the Property and Casualty Risk-Based Capital (E) Working Group and Catastrophe Risk (E) Subgroup adjourned.

SharePoint/NAIC Support Staff Hub/ Member Meetings/E Cmte/CADTF/2026-Spring/PCRBCWG/Joint PCRBC Cat Risk Email Vote 012826

Draft: 11/14/25

Property and Casualty Risk-Based Capital (E) Working Group
and Catastrophe Risk (E) Subgroup
Virtual Meeting
November 12, 2025

The Property and Casualty Risk-Based Capital (E) Working Group of the Capital Adequacy (E) Task Force met Nov. 12, 2025, in joint session with the Catastrophe Risk (E) Subgroup of the Property and Casualty Risk-Based Capital (E) Working Group. The following Working Group members participated: Tom Botsko, Chair (OH); Wanchin Chou, Vice Chair (CT); Rolf Kaumann and Eric Unger (CO); Shalice Rivers (FL); Sandra Darby (ME); Melissa Robertson (NM); Ni Qin (NY); Will Davis (SC); and Adrian Jaramillo (WI). The following Subgroup members participated: Wanchin Chou, Chair (CT); Shalice Rivers (FL); Rolf Kaumann and Eric Unger (CO); Travis Grassel (IA); Sandra Darby (ME); Melissa Robertson (NM); Tom Botsko (OH); Andy Schallhorn (OK); and Will Davis (SC). Also participating was: Steve Drutz (WA).

1. Adopted the Working Group and Subgroup's Joint Oct. 8 Minutes

Botsko said the Working Group and Subgroup met Oct. 8 and took the following action: 1) adopted their June 30 minutes; 2) discussed the catastrophe modeling wildfire review and impact analysis; 3) discussed the possibility of updating the Rcat covariance formula; 4) discussed the possibility of separating the earthquake and hurricane losses experience PR100s; 5) discussed the Securities Valuation Office (SVO)-funded risk-based capital (RBC) alignment project; 6) heard updates from the American Academy of Actuaries (Academy) regarding property/casualty (P/C) RBC premium and loss concentration factors; and 7) discussed accident and health structure in the P/C RBC formula.

Chou made a motion, seconded by Darby, to adopt the Working Group and Subgroup's joint Oct. 8 minutes (*see NAIC Proceedings – Fall 2025, Capital Adequacy (E) Task Force, Attachment Five*). The motion passed unanimously.

2. Adopted Proposal 2025-08-CR (Jan. 1 – Oct. 15 Cat Event List)

Chou stated that proposal 2025-08-CR consolidates both U.S. and international catastrophe event lists spanning from 2016 to 2025 for use in year-end 2025 reporting. This comprehensive list encompasses major peril types, including hurricanes, earthquakes, wildfires, and severe convective storms. The first version of the 2025 event list, covering incidents from January through October, was made available for public comment via an e-vote on Nov. 3, with no feedback received during the seven-day exposure period. Chou further noted that a revised iteration of the event list will be released for additional public comment in early January 2026, with adoption anticipated by February 2026. Darby highlighted the importance of establishing and maintaining consistent terminology when referencing event types. Chou concurred with this recommendation and directed NAIC staff to update and harmonize the terminology prior to the release of the second iteration of the event list.

Grassel made a motion, seconded by Darby, to adopt proposal 2025-08-CR (Attachment XXX). The motion passed unanimously.

3. Exposed Proposal 2025-19-CR (Separating Earthquake and Hurricane Lines Experience Data in PR100s)

Chou clarified that, while wildfire and severe convective storm losses are currently reported separately in PR100s, hurricane and earthquake experience data remain combined. The proposed change seeks to separate hurricane and earthquake losses, thereby aligning their reporting with that of other perils. This adjustment will enable both

the Subgroup and the Working Group to more effectively address each risk, taking into account their unique characteristics and impacts.

The Working Group and Subgroup concurred to expose proposal 2025-19-CR (Attachment XXX) for a 60-day public comment period ending Jan. 11, 2026.

4. Exposed Proposal 2025-20-CR (Wildfire Rcat Implementation)

Chou reiterated that beginning in June and July of this year, the Subgroup collaborated with four modeling vendors to conduct a second round of impact analysis, utilizing consistent exposure inputs across all models. The Subgroup reconvened Sept. 25 to review and address feedback from the impact analysis presentations. A comparative assessment between the initial 2022 impact analysis and the current evaluation demonstrated that model outputs have become increasingly consistent over time. As a result, the Subgroup has greater confidence in the reliability of these models and their applicability to risk management. He stated that this proposal aims to include wildfire peril in the Rcat component, reflecting the enhanced reliability and applicability of the catastrophe models.

The Working Group and Subgroup concurred to expose proposal 2025-20-CR (Attachment XXX) for a 60-day public comment period ending Jan. 11, 2026.

5. Discussed the Working Group and Subgroup's Working Agenda

Botsko provided an overview of the key updates to the Working Group and Subgroup's 2026 working agenda. Changes include: 1) revising expected completion dates, ongoing items, and comments for items P1, P3, P4, P5, P6, and P7; 2) removing completed items from the original P7 and P8; and 3) introducing three new initiatives to the "New Items" section: a) evaluate the possibility of adding wildfire peril in the Rcat component; b) evaluate the possibility of separating earthquake and hurricane loss experience data in PR100s; and c) evaluate the possibility of updating the loss and premium concentration factors in PR017 and PR018.

6. Discussed the SVO-Funded RBC Alignment Project

Botsko reported that the Working Group received three comment letters on the SVO-funded RBC alignment project during the exposure period. John Muska (American Property Casualty Insurance Association—APCIA) conveyed the APCIA's endorsement of the proposal to harmonize RBC requirements for SVO-designated bond funds, including exchange-traded funds (ETFs), mutual funds, and private funds, as considered by the Working Group. Muska observed that the proposal presents a valuable opportunity to pilot the draft principles established by the Risk-Based Capital Model Governance (E) Task Force. Furthermore, he highlighted that the initiative would be particularly advantageous for smaller insurers, who may not possess the portfolio scale necessary for direct bond investments, by enabling access to diversified bond funds without increasing risk exposure. Muska also requested that the inherent flexibility in filing with the SVO be preserved, ensuring insurers retain the ability to tailor their investment strategies as needed.

Jonathan Rodgers (National Association of Mutual Insurance Companies—NAMIC) expressed support for the current regulatory framework, specifically the established two-step process that enables issuers and insurers to submit investment fund holdings to the SVO for designation of certain bond funds. Rodgers affirmed NAMIC's endorsement of existing RBC governance standards, which emphasize the importance of focusing on measurable risks that could impact insurer solvency. He recommended that the Working Group conduct a thorough analysis of the underlying risks associated with these funds before implementing any changes to RBC requirements. Furthermore, Rodgers stressed that any modifications necessitating additional regulatory infrastructure or increased company expenses should be carefully evaluated to ensure they deliver tangible benefits to solvency

oversight. Finally, he noted NAMIC's support for allowing regulators the discretion to prioritize potential changes to RBC requirements as appropriate. In response, Chou inquired about the recommended approach for conducting risk assessment analyses. Rodgers advised leveraging the expertise of existing SVO staff, supplemented by NAIC RBC staff as needed, to evaluate whether the instruments in question align with the characteristics of traditional bonds. He also referenced prior impact assessments conducted by the Working Group, indicating that this methodology remains suitable under current governance standards.

Kieth Bell (Travelers) provided additional comments supplementing those previously submitted to the Risk-Based Capital Investment Risk and Evaluation (E) Working Group. Bell recommended that the proposal would be strengthened by an analysis of its actual impact on RBC charges and ratios at the individual company level, with results aggregated across various scenarios involving changes to R2 factors. He noted that the data was skewed by two large companies with significant equity holdings, which distorted the R2 analysis. Furthermore, Bell emphasized the importance of considering the additional risks associated with investing in mutual funds and bond funds compared to direct bond investments.

Chou expressed agreement with the recommendations from both NAMIC and Travelers regarding the importance of conducting a comprehensive risk assessment. Chou indicated that such an evaluation would be valuable for the Working Group's deliberations. Botsko concurred, emphasizing that performing a thorough analysis on this topic is essential to ensure its appropriateness for inclusion in the P/C RBC framework.

7. Received an Update from the Health Risk-Based Capital (E) Working Group Regarding Proposal 2025-15-CA (A&H Underwriting Risk Structure Change)

Drutz reported that the Academy presented its H2—Underwriting Risk Component and Managed Care Credit Calculation within the Health Risk-Based Capital Formula Report to the Health Risk-Based Capital (E) Working Group at its April 30 meeting. The report introduced a revised structure designed to closely align the underwriting risk pages with the lines of business as reflected in the analysis of operations of the Health Annual Statement. Additionally, the report recommended implementing similar changes in the life and P/C RBC formulas to mirror the updates made in the health RBC formula. The proposed revisions incorporate changes to the underwriting risk structure found on XR013, LR020, and PR020, and include the removal of the two-times individual risk from the alternate risk charge. Drutz noted that the proposal is exposed for a public comment period ending Jan. 20, 2026, and is available on the P/C, life, and health RBC working groups' web pages under the exposures tab. Botsko encouraged all interested parties to review the proposal and submit comments to the Health Risk-Based Capital (E) Working Group during the exposure period.

8. Exposed a Presentation from the Academy Regarding the Property and Casualty Risk-Based Capital Premium and Loss Concentration Factors Report

Allan Kaufman (Academy) presented the Academy's evaluation of premium concentration factors (PCFs) and loss concentration factors (LCFs) within the RBC formula, emphasizing diversification credit for insurers with multiple lines of business. The presentation addressed: 1) revisions to diversification credit parameters; 2) data and methodology; 3) calculation of maximum diversification credit (MDC); 4) linearity; 5) alternative data; 6) the CoMAxLine% approach; 7) investment income adjustment (IIA) sequencing; and 8) safety and regulatory considerations.

Botsko invited stakeholders to review the report and submit comments during the exposure period. He said feedback will be discussed at the next meeting.

The Working Group and Subgroup agreed to expose the report (Attachment XXX) for a 60-day public comment period ending Jan. 11, 2026.

9. Discussed Other Matters

Botsko announced that the Working Group and Subgroup will not convene in person at the Fall National Meeting. Instead, they plan to reconvene in spring 2026 to address outstanding agenda items.

Having no further business, the Property and Casualty Risk-Based Capital (E) Working Group and Catastrophe Risk (E) Subgroup adjourned.

SharePoint/NAIC Support Staff Hub/ Member Meetings/E Cmte/CADTF/2025-Fall/PCRBCWG/Joint PCRBC Cat Risk Minutes 111225.docx

Capital Adequacy (E) Task Force

RBC Proposal Form

☐ Capital Adequacy (E) Task Force
☒ Catastrophe Risk (E) Subgroup
☐ Variable Annuities Capital. & Reserve (E/A) Subgroup
☐ Health RBC (E) Working Group
☐ P/C RBC (E) Working Group
☐ Economic Scenarios (E/A) Subgroup
☐ Life RBC (E) Working Group
☐ Longevity Risk (A/E) Subgroup
☐ RBC Investment Risk & Evaluation (E) Working Group

DATE: 11/12/25

CONTACT PERSON: Eva Yeung
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EMAIL ADDRESS: eyeung@naic.org
ON BEHALF OF: Catastrophe Risk (E) Subgroup
NAME: Wanchin Chou
TITLE: Chair
AFFILIATION: Connecticut Department of Insurance
ADDRESS: 153 Market St., Hartford CT 06103

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Agenda Item #2025-19-CR
Year 2026

DISPOSITION

ADOPTED:
☐ TASK FORCE (TF) _____
☐ WORKING GROUP (WG) _____
☐ SUBGROUP (SG) _____

EXPOSED:
☐ TASK FORCE (TF) _____
☒ WORKING GROUP (WG) 11/12/2025
☒ SUBGROUP (SG) 11/12/2025

REJECTED:
☐ TF ☐ WG ☐ SG _____

OTHER:
☐ DEFERRED TO _____
☐ REFERRED TO OTHER NAIC GROUP
☐ (SPECIFY) _____

IDENTIFICATION OF SOURCE AND FORM(S)/INSTRUCTIONS TO BE CHANGED

☐ Health RBC Blanks
☐ Health RBC Instructions
☐ Health RBC Formula
☒ Property/Casualty RBC Blanks
☐ Property/Casualty RBC Instructions
☐ Property/Casualty RBC Formula
☐ Life and Fraternal RBC Blanks
☐ Life and Fraternal RBC Instructions
☐ Life and Fraternal RBC Formula
☐ OTHER _____

DESCRIPTION/REASON OR JUSTIFICATION OF CHANGE(S)

The objective of this proposal is to differentiate hurricane and earthquake losses, following the methodology applied to wildfire and severe convective storm events. This distinction will enable the Subgroup and Working Group to more effectively manage and address each peril, considering their unique characteristics and impacts.

Additional Staff Comments:

** **This section must be completed on all forms.** **Revised 2-2023**

SCHEDULE P PART 1XX - XXXX PR100s

	(3) Premiums Earned, Net	(24) Total Net Losses and Expenses Unpaid	(28) Total Losses and Expenses Incurred, Net	Earthquake Catastrophe Experience* (24AI) Total U.S. Net Losses Unpaid	(28AI) Total U.S. Losses Incurred, Net	(24BI) Total Non-U.S. Net Losses Unpaid	(28BI) Total Non-U.S. Losses Incurred, Net	Hurricane Catastrophe Experience* (24AII) Total U.S. Net Losses Unpaid	(28AII) Total U.S. Losses Incurred, Net	(24BII) Total Non-U.S. Net Losses Unpaid	(28BII) Total Non-U.S. Losses Incurred, Net	Wildfire Catastrophe Experience* (24AIII) Total U.S. Net Losses Unpaid	(28AIII) Total U.S. Losses Incurred, Net	(24BIII) Total Non-U.S. Net Losses Unpaid	(28BIII) Total Non-U.S. Losses Incurred, Net	(28C) Total Losses and Expenses Incurred, Net excluding Earthquake, Hurricane and Wildfire Losses
(2) 2017	0		0		0		0		0		0		0		0	0
(3) 2018	0		0		0		0		0		0		0		0	0
(4) 2019	0		0		0		0		0		0		0		0	0
(5) 2020	0		0		0		0		0		0		0		0	0
(6) 2021	0		0		0		0		0		0		0		0	0
(7) 2022	0		0		0		0		0		0		0		0	0
(8) 2023	0		0		0		0		0		0		0		0	0
(9) 2024	0		0		0		0		0		0		0		0	0
(10) 2025	0		0		0		0		0		0		0		0	0
(11) 2026	0		0		0		0		0		0		0		0	0
(12) Totals		0		0		0		0		0		0		0		

	Convective Storms Catastrophe Experience* (24III) Total U.S. Net Losses Unpaid	(28III) Total U.S. Losses Incurred, Net	(24IV) Total Non-U.S. Net Losses Unpaid	(28IV) Total Non-U.S. Losses Incurred, Net	(28V) Total Losses and Expenses Incurred, Net excluding Earthquake, Hurricane, Wildfire and Convective Storms Losses
(2) 2017		0		0	0
(3) 2018		0		0	0
(4) 2019		0		0	0
(5) 2020		0		0	0
(6) 2021		0		0	0
(7) 2022		0		0	0
(8) 2023		0		0	0
(9) 2024		0		0	0
(10) 2025		0		0	0
(11) 2026		0		0	0
(12) Totals	0		0		

vendor link items

manual data entry items

*Please provide losses only; no expenses. Catastrophe losses should 1.) be the net losses incurred for the reporting entity, not net losses incurred for the group; 2.) be a subset of, and therefore, less than, total net losses reported in Column (28); 3.) be reported in 000s to be consistent with all values reported in this exhibit; and 4.) not be reported as negative amounts.

**If this line of business has incurred U.S. catastrophe losses arising from events either included on the list of U.S. catastrophe events approved by the Catastrophe Risk Subgroup as available on the NAIC's website or numbered and labeled by PCS as a hurricane, tropical storm, or earthquake, provide only the amount of those catastrophe losses in Catastrophe Experience columns (24AI), (24AII), (24AIII), (28AI), (28AII) and (28AIII).

***If this line of business has incurred non-U.S. catastrophe losses arising from a hurricane, tropical storm, or earthquake from an event included on the list of non-U.S. catastrophe events approved by the Catastrophe Risk Subgroup as available on the NAIC's website, provide only the amount of those catastrophe losses in Catastrophe Experience Columns (24BI),(24BII), (24BIII), (28BI), (28BII) and (28BIII).

****Columns 24III through 28V are for informational purposes only.

Capital Adequacy (E) Task Force
RBC Proposal Form

☐ Capital Adequacy (E) Task Force
☒ Catastrophe Risk (E) Subgroup
☐ Variable Annuities Capital. & Reserve (E/A) Subgroup
☐ Health RBC (E) Working Group
☐ P/C RBC (E) Working Group
☐ Economic Scenarios (E/A) Subgroup
☐ Life RBC (E) Working Group
☐ Longevity Risk (A/E) Subgroup
☐ RBC Investment Risk & Evaluation (E) Working Group

DATE: 11/12/25

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ON BEHALF OF: Catastrophe Risk (E) Subgroup
NAME: Wanchin Chou
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Agenda Item #2025-20-CR
Year 2026

DISPOSITION

ADOPTED:
☐ TASK FORCE (TF)
☐ WORKING GROUP (WG)
☐ SUBGROUP (SG)

EXPOSED:
☐ TASK FORCE (TF)
☒ WORKING GROUP (WG) 11/12/2025
☒ SUBGROUP (SG) 11/12/2025

REJECTED:
☐ TF ☐ WG ☐ SG

OTHER:
☐ DEFERRED TO
☐ REFERRED TO OTHER NAIC GROUP
☐ (SPECIFY)

IDENTIFICATION OF SOURCE AND FORM(S)/INSTRUCTIONS TO BE CHANGED

☐ Health RBC Blanks
☐ Health RBC Instructions
☐ Health RBC Formula
☒ Property/Casualty RBC Blanks
☒ Property/Casualty RBC Instructions
☐ Property/Casualty RBC Formula
☐ Life and Fraternal RBC Blanks
☐ Life and Fraternal RBC Instructions
☐ Life and Fraternal RBC Formula
☐ OTHER

DESCRIPTION/REASON OR JUSTIFICATION OF CHANGE(S)

Building on the precedent set by the 2021 wildfire review, an ad hoc group was re-established and began a new evaluation cycle on March 18, guided by the Actuarial Standard of Practice (ASOP) No. 38—Catastrophe Modeling for All Practice Areas. This comprehensive process included high-level analysis, confidential assessments, and detailed impact studies. In addition to the original three vendors—Moody Risk Management Solutions (RMS), Verisk Extreme Event Solutions, and KCC—CoreLogic joined as a new participant for this review cycle. Starting in early June and July, the group collaborated with all four vendors to conduct a second round of impact analysis using consistent exposure inputs. On September 25, the group reconvened to address feedback from the impact analysis presentations. A comparative review of the initial 2022 assessment and the current evaluation revealed that model outputs have become increasingly consistent. As a result, the Subgroup now has greater confidence in the models and their suitability for risk management applications.

This proposal formally recommends adding wildfire peril to the Rcat component, reflecting the enhanced reliability and applicability of the catastrophe models.

Additional Staff Comments:

** **This section must be completed on all forms.** **Revised 2-2023**

CALCULATION OF CATASTROPHE RISK CHARGE RCAT
PR027A, PR027B, PR027BI, PR027BII, PR027BIII, PR027BIV PR027C, PR027CI, PR027CII, PR027CIII, PR027CIV, PR027D, PR027, PR027INT, AND PR027INTA

The catastrophe risk charge for earthquake (PR027A), hurricane (PR027B), wildfire (PR027C) and convective storms for informational purposes only (~~PR027C and~~ PR027D) risks is calculated by multiplying the RBC factors by the corresponding modeled losses and reinsurance recoverables. The risk applies on a net basis with a corresponding contingent credit risk charge for certain categories of reinsurers. Data must be provided for the worst year in 50, 100, 250, and 500; however, only the worst year in 100 will be used in the calculation of the catastrophe risk charge. While projected losses modeled on an Aggregate Exceedance Probability basis is preferred, companies are permitted to report on an Occurrence Exceedance Probability basis if that is consistent with the company's internal risk management process.

The projected losses can be modeled using the following NAIC approved third-party commercial vendor catastrophe models: AIR, CoreLogic, RMS, KCC for earthquake, ~~and~~ hurricane, and wildfire only, ~~RMS, KCC,~~ the ARA HurLoss Model (hurricane ~~only~~), or the Florida Public Model for hurricane only, as well as catastrophe models that are internally developed by the insurer or that are the result of adjustments made by the insurer to vendor models to represent the own view of catastrophe risk (hereinafter "own models").

However, an insurer seeking to use an own model must first obtain written permission to do so by the domestic or lead state insurance regulator. In the situation where the model output is used to determine the catastrophe risk capital requirement for a single entity, the regulator granting permission to use the own model is the domestic state. In the situation where the model output is used to determine the catastrophe risk capital requirement for a group, the grantor is the lead state regulator. In the situation where the insurer seeking permission is a non-U.S. insurer, the grantor shall be the lead state regulator. Under all scenarios, the regulator that is granting permission should inform other domestic states that have a catastrophe risk exposure and share the results of the review.

To obtain permission to use the own model, the insurer must provide the domestic or lead state insurance regulator with written evidence of each of the following:

1. The nature, scale, and complexity of the insurer's catastrophe risk make it reasonable for the insurer to use its own model.
2. The own model is used for catastrophe risk management, capital assessment, and the capital allocation process.
3. The insurer has validated the own model(s) for each of the perils included in the RBC catastrophe risk charge. The insurer is including both U.S. and non-U.S. exposures in the calculation of the RBC charge.
4. The insurer has individuals with experience in developing, testing and validating internal models or engages third parties with such experience.
5. The own model was developed using reasonable data and assumptions.
6. The insurer must provide supporting model documentation and/or the differences from the vendor models if modified from the vendor models, supporting that the model was developed using reasonable data and assumptions. The insurer must provide a copy of the latest validation report and the insurer is solely responsible for the relevant cost. The validation report must provide a description of the scope, content, results and limitations of the validation, the individual qualifications of validation team and the date of the validation. Both the model documentation and the model validation report must be provided at a minimum once every five years, or whenever the lead or domestic state calls an examination; whenever there is a material change in the model; or whenever there is a material change in the insurer's exposure to catastrophe exposure.
7. The results of the own model for each relevant peril should be compared with the results produced by at least one of the following models: AIR, CoreLogic, RMS, and KCC for earthquake, ~~and~~ hurricane and wildfire only, ~~RMS, KCC,~~ ARA HurLoss (hurricane ~~only~~), or the Florida Public Model for hurricane only. The insurer must provide the comparison and an explanation of the drivers of differences between the results produced by the internal model vs. results produced by the selected prescribed model. Evidence that the own model produces reasonable results must be provided at a minimum once every

five years, or whenever the lead or domestic state calls an examination; whenever there is a material change in the model; or whenever there is a material change in the insurer's exposure to catastrophe exposure.

8. If the own model has been approved or accepted by the non-U.S. lead supervisor for use in the determination of regulatory capital, the insurer must submit evidence, if available, from the non-US lead supervisor of the most recent approval/acceptance including the description of scope, content, results and limitations of the approval/acceptance process and dates of any planned future approval/acceptance, if known. The name and the contact information of a contact person at the non-US lead supervisor should also be provided for questions on the approval/acceptance process.

If the lead or domestic state determines that permission to use the own model cannot be granted, the insurer shall be required to determine the RBC Catastrophe Risk Charge through the use of one of the third-party commercial vendor models (AIR, CoreLogic, RMS, and KCC for earthquake, ~~and~~ hurricane, and wildfire only, ~~RMS, KCC,~~ ARA HurLoss (hurricane ~~only~~)), or the Florida Public Model for hurricane only, as advised by the lead state or domestic state.

If the lead or domestic state determines that permission to use the own model can be granted to determine the RBC Catastrophe Risk Charge, the model will be subject to additional review through the ongoing examination process. If, as a result of the examination, the lead or domestic state determines that permission to use the own model should be revoked, the insurer may be required to resubmit the risk-based capital filing and any past filings so impacted where own model was used, as directed by the lead state or domestic state.

If the insurer obtains permission to use the own model, it cannot revert back to using third-party commercial vendor models to determine the RBC Catastrophe Risk Charge in subsequent reporting periods, unless this is agreed with the lead or domestic state that granted permission.

The contingent credit risk charge should be calculated in a manner consistent with the way the company internally evaluates and manages its modeled net catastrophe risk.

Note that no tax effect offsets or reinstatement premiums should be included in the modeled losses. Further note that the catastrophe risk charge is for earthquake, ~~and~~ hurricane, and wildfire risks only.

As per the footnote on this page, modeled losses to be entered PR027A, PR027B PR027C and PR027D in Lines (1) through (4) are to be calculated using one of the **third-party** commercial **vendor** models – AIR, CoreLogic, RMS, and KCC for earthquake, ~~and~~ hurricane, and wildfire only, ~~RMS, KCC,~~ ARA HurLoss (hurricane ~~only~~); or the Florida Public Model ~~(~~for hurricane only~~)~~**or the insurer's own catastrophe model**; and using the insurance company's own insured property exposure information as inputs to the model. The insurance company may elect to use the modeled results from any one of the models, or any combination of results of two or more of the models. Each insurer will not be required to utilize any prescribed set of modeling assumptions but will be expected to use the same exposure data, modeling, and assumptions that the insurer uses in its own internal catastrophe risk management process. Any exceptions must be explained in the required *Attestation Re: Catastrophe Modeling Used in RBC Catastrophe Risk Charges* within this RBC Report.

CALCULATION OF CATASTROPHE RISK CHARGE FOR WILDFIRE PR027C
~~(For Informational Purposes Only)~~

	Wildfire	Reference	Modeled Losses (1) Direct and Assumed	(2) Net	(3)† Ceded Amounts Recoverable	(4)†† Ceded Amounts Recoverable with zero Credit Risk Charge
(1)	Worst Year in 50	Company Records				
(2)	Worst Year in 100	Company Records				
(3)	Worst Year in 250	Company Records				
(4)	Worst Year in 500	Company Records				
(5)	Worst Year in 1000 **(For Informational Purposes Only)**	Company Records				

		(5) Y/N
(6)	Has the company reported above, its modeled wildfire losses using an occurrence exceedance probability (OEP) basis?	

		Reference	(6) Amount	Factor	(7) RBC Requirement (C(6) * Factor)
(7)	Net Wildfire Risk	L(2) C(2)	0	1.000	0
(8)	Contingent Credit Risk for Wildfire Risk	L(2)(C(3) - C(4))	0	0.018	0
(9)	Total Wildfire Catastrophe Risk (AEP Basis)	If L(6) C(5) = "N", L(9) C(6) = L(7) C(7)+ L(8) C(7), otherwise "0"	0	1.000	0
(10)	Total Wildfire Catastrophe Risk (OEP Basis)	If L(6) C(5) = "Y", L(10) C(6) = L(7) C(7)+ L(8) C(7), otherwise "0"	0	1.000	0
(11)	Total Wildfire Catastrophe Risk	L(9) C(7) + L(10) C(7)			0

Disclosure in lieu of model-based reporting:

		(8) Direct and Assumed	(9) Net
(12)	For a company qualifying for the exemption under PR027INT C (10), complete 12a through 12c below:		
	a. Provide the company's gross and net 1-in-100-year wildfire losses on a best estimate basis in lieu of model-based reporting.		

b. Provide details on how the company estimated the amounts shown in 12a.

c. Provide a narrative disclosure about how the company manages its wildfire risk.

Lines (1)-(5): Modeled losses to be entered on these lines are to be calculated using one of the following NAIC approved third party commercial vendor catastrophe models - AIR, RMS, ~~or~~ KCC**, Corelogic~~,~~** or a catastrophe model that is internally developed by the insurer and has received permission of use by the lead or domestic state. The insurance company's own insured property exposure information should be used as inputs to the model(s). The insurance company may elect to use the modeled results from any one of the models, or any combination of the results of two or more of the models. Each insurer will not be required to utilize any prescribed set of modeling assumptions, but will be expected to use the same data, modeling, and assumptions that the insurer uses in its own internal catastrophe risk management process. An attestation to this effect and an explanation of the company's key assumptions and model selection may be required, and the company's catastrophe data, assumptions, model and results may be subject to examination.

† Column (3) is modeled catastrophe losses that would be ceded under reinsurance contracts. This should be associated with the Net Modeled Losses shown in Column (2).

††Column (4) is modeled catastrophe losses that would be ceded to the categories of reinsurers that are not subject to the RBC credit risk charge (i.e., U.S. affiliates and mandatory pools, whether authorized, unauthorized, or certified).

CALCULATION OF CATASTROPHE RISK CHARGE PR027

		Reference	(1) RBC Amount
(1)	Total Earthquake Catastrophe Risk	PR027A L(10) C(7)	0
(2)	Total Hurricane Catastrophe Risk	PR027B L(11) C(7)	0
(3)	Total Wildfire Catastrophe Risk	PR027C L(11)C(7)	0
(4)	Total Convective Storms Catastrophe Risk	PR027D L(10)C(7)	0
(5)	Total Catastrophe Risk (R_{cat})	SQRT(L(1)^2 + L(2)^2 + **L(3)^2**)	0
(5a)	Total Catastrophe Risk (R_{cat} For Informational Purposes Only)	SQRT(L(1)^2 + L(2)^2 +L(3)^2+L(4)^2)	0

Lines ~~3,~~ 4, and 5a are for informational purposes only

P&C RBC - Comparison of RBC Action Level between Current RBC Formula and RBC Formula Including the Wildfire Peril

(Including Companies that write catastrophe business)

		2024 RBC Action Level under Current RBC Formula			
		No Action	Trend Test	MCL	Total
2024 RBC Action Level Including Wildfire Peril	No Action	868			868
	Trend Test	2	7		9
	MCL			4	4
	Total	870	7	4	881

(Including Companies that write catastrophe business)

		2025 RBC Action Level under Current RBC Formula			
		No Action	Trend Test	MCL	Total
2025 RBC Action Level Including Wildfire Peril	No Action	863			863
	Trend Test		4		4
	MCL			1	1
	Total	863	4	1	868

Capital Adequacy (E) Task Force

RBC Proposal Form

☐ Capital Adequacy (E) Task Force ☐ Health RBC (E) Working Group ☐ Life RBC (E) Working Group
☒ Catastrophe Risk (E) Subgroup ☐ P/C RBC (E) Working Group ☐ Longevity Risk (A/E) Subgroup
☐ Variable Annuities Capital. & Reserve (E/A) Subgroup ☐ Economic Scenarios (E/A) Subgroup ☐ RBC Investment Risk & Evaluation (E) Working Group

DATE: 2/23/26	**FOR NAIC USE ONLY**
CONTACT PERSON: Eva Yeung	Agenda Item #2026-08-CR
TELEPHONE: 816-783-8407	Year 2026
EMAIL ADDRESS: eyeung@naic.org	**DISPOSITION**
ON BEHALF OF: Catastrophe Risk (E) Subgroup	**ADOPTED:**
NAME: Wanchin Chou	☐ TASK FORCE (TF) ☐ WORKING GROUP (WG) ☐ SUBGROUP (SG)
TITLE: Chair	**EXPOSED:**
AFFILIATION: Connecticut Department of Insurance	☐ TASK FORCE (TF) ☐ WORKING GROUP (WG) ☐ SUBGROUP (SG)
ADDRESS: 153 Market St., Hartford CT 06103	**REJECTED:**
	☐ TF ☐ WG ☐ SG
	OTHER:
	☐ DEFERRED TO
	☐ REFERRED TO OTHER NAIC GROUP
	☐ (SPECIFY)

IDENTIFICATION OF SOURCE AND FORM(S)/INSTRUCTIONS TO BE CHANGED

☐ Health RBC Blanks ☒ Property/Casualty RBC Blanks ☐ Life and Fraternal RBC Blanks
☐ Health RBC Instructions ☒ Property/Casualty RBC Instructions ☐ Life and Fraternal RBC Instructions
☐ Health RBC Formula ☐ Property/Casualty RBC Formula ☐ Life and Fraternal RBC Formula
☐ OTHER _____

DESCRIPTION/REASON OR JUSTIFICATION OF CHANGE(S)

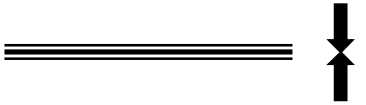
The purpose of this proposal is to eliminate questions D13 and D14 from PR027INT. This action is recommended because there are currently no clearly defined areas that are considered prone to convective storms. As a result, retaining these questions may lead to ambiguity and inconsistency in data collection and reporting.

Additional Staff Comments:

** **This section must be completed on all forms.** **Revised 2-2023**

CALCULATION OF CATASTROPHE RISK CHARGE RCAT
PR027A, PR027B, PR027BI, PR027BII, PR027BIII, PR027BIV PR027C, PR027CI, PR027CII, PR027CIII, PR027CIV, PR027D, PR027, PR027INT, AND PR027INTA

Detail Eliminated To Conserve Space



The Interrogatory on page (PR027INT) supports an exemption from filing the catastrophe risk charge.

Any company qualifying for exemption from the earthquake risk charge must identify the particular criteria from among (1a), (1b), (2) and (3) that provides its qualification for exemption, and may leave the other three items from this group of four possible qualifications for exemption blank; except identification of criteria (3) as the basis for the exemption requires a further answer to (3a) and (3b).). If an insurer does not write or assume earthquake risks leaving no gross exposure, enter an "X" in PR027INT interrogatory 3, with no need to fill in (3a) and (3b). If the company qualifies for exemption from the earthquake risk charge, page PR027A and line (1) on PR027 may be left blank.

Any company qualifying for exemption from the hurricane risk charge must identify the particular criteria from among (4a), (4b), (5) and (6) that provides its qualification for exemption, and may leave the other three items from this second group of four possible qualifications for exemption blank. If an insurer does not write or assume hurricane risks leaving no gross exposure, enter an "X" in PR027INT interrogatory 6.If the company qualifies for exemption from the hurricane risk charge, page PR027B and line (2) on PR027 may be left blank.

Any company qualifying for exemption from the wildfire risk charge must identify the particular criteria from among (7a), (7b), (8), (9), and (10) that provides its qualification for exemption and may leave the other four items from this third group of five possible qualifications for exemption blank. If an insurer does not write or assume wildfire risks leaving no gross exposure, enter an "X" in PR027INT interrogatory 9. If the company qualifies for exemption from the wildfire risk charge, page PR027C and line (3) on PR027 may be left blank.

Any company qualifying for exemption from the convective storms risk charge must identify the particular criteria from among (11a), (11b), and (12)~~, (13) and (14)~~ that provides its qualification for exemption and may leave the other ~~four~~ two items from this fourth group of ~~five~~ three possible qualifications for exemption blank. ~~If an insurer does not write or assume convective storms risks leaving no gross exposure, enter an "X" in PR027INT interrogatory 13. If the company qualifies for exemption from the convective storms risk charge, page PR027D and line (4) on PR027 may be left blank.~~

Detail Eliminated To Conserve Space

INTERROGATORY TO SUPPORT EXEMPTION FROM COMPLETING PR027 (To be completed by companies reporting no RBC charge in either Lines 1 through 4) PR027INT

Place an "X" in the appropriate cell for the criteria under which the company is claiming an exemption

A Earthquake Exemption (To be completed by companies reporting no RBC charge in PR027 Line 1) -

(1) The company has not entered into a reinsurance agreement covering earthquake exposure with a non-affiliate or a non-US affiliate and, either

(1a) the company participates in an inter-company pooling arrangement with 0% participation, leaving no net exposure for earthquake risks; Or

(1b) the company cedes 100% of its earthquake exposures to its US affiliate(s), leaving no net exposure for earthquake risks

(2) The Company's Ratio of Insured Value - Property to surplus as regards policyholders is less than 50%

(3) The company has written Insured Value - Property that includes earthquake coverage in the Earthquake-Prone areas representing less than 10% of its surplus as regards policyholders

For any company qualifying for the exemption under 3 provide details about how the "geographic areas in the New Madrid Seismic Zone" were determined.

(3a) What resource was used to define the New Madrid Seismic Zone?

(3b) Was exposure determined based on zip codes or counties in the zone, was it based on all of the earthquake exposure in the identified states or was another methodology used? Describe any other methodology used.

Note: "Earthquake-Prone areas" include any of the following states or commonwealths: Alaska, Hawaii, Washington, Oregon, California, Idaho, Nevada, Utah, Arizona, Montana, Wyoming, Colorado, New Mexico, Puerto Rico, and geographic areas in the following states that are in the New Madrid Seismic Zone - Missouri, Arkansas, Mississippi, Tennessee, Illinois and Kentucky.

B Hurricane Exemption (To be completed by companies reporting no RBC charge in PR027 Line 2) -

(4) The company has not entered into a reinsurance agreement covering hurricane exposure with a non-affiliate or a non-US affiliate and, either

(4a) the company participates in an inter-company pooling arrangement with 0% participation, leaving no net exposure for hurricane risks; Or

(4b) the company cedes 100% of its hurricane exposures to its US affiliate(s), leaving no net exposure for hurricane risks

(5) The Company's Ratio of Insured Value - Property to surplus as regards policyholders is less than 50%

(6) The company has written Insured Value - Property that includes hurricane coverage in the Hurricane-Prone areas representing less than 10% of its surplus as regards policyholders

Note: "Hurricane-Prone areas" include Hawaii, District of Columbia and states and commonwealths bordering on the Atlantic Ocean, and/or Gulf of Mexico including Puerto Rico.

C Wildfire Exemption (To be completed by companies reporting no RBC charge in PR027 Line 3) -

(7) The company has not entered into a reinsurance agreement covering wildfire exposure with a non-affiliate or a non-US affiliate and, either

(7a) the company participates in an inter-company pooling arrangement with 0% participation, leaving no net exposure for wildfire risks; Or

(7b) the company cedes 100% of its wildfire exposures to its US affiliate(s), leaving no net exposure for wildfire risks

(8) The Company's Ratio of Insured Value - Property to surplus as regards policyholders is less than 50%

(9) The company has written Insured Value - Property that includes wildfire coverage in the wildfire-Prone areas representing less than 10% of its surplus as regards policyholders

(10) The sum of the direct and assumed premium written in wildfire-prone areas across the following Annual Statement lines is less than $50 million: Fire, Allied Lines, Earthquake, Farmowners, Homeowners, and Commercial Multi-Peril; and the company does not currently utilize NAIC approved third party commercial vendor wildfire catastrophe models.

Note: "Wildfire-Prone areas" include any of the following states: California, Idaho, Montana, Oregon, Nevada, Wyoming, Colorado, New Mexico, Washington, Arizona, and Utah.

D Convective Storms Exemption (To be completed by companies reporting no RBC charge in PR027 Line 4) -

(11) The company has not entered into a reinsurance agreement covering Convective Storms exposure with a non-affiliate or a non-US affiliate and, either

(11a) the company participates in an inter-company pooling arrangement with 0% participation, leaving no net exposure for Convective Storms risks; Or

(11b) the company cedes 100% of its convective storms exposures to its US affiliate(s), leaving no net exposure for Convective Storms risks

(12) The Company's Ratio of Insured Value - Property to surplus as regards policyholders is less than 50%

~~(13) The company has written Insured Value - Property that includes Convective Storms coverage in the Convective Storms-Prone areas representing less than 10% of its surplus as regards policyholders~~

~~(14) The sum of the direct and assumed premium written in Convective Storms-prone areas across the following Annual Statement lines is less than $50 million: Fire, Allied Lines, Earthquake, Farmowners, Homeowners, and Commercial Multi-Peril; and the company does not currently utilize NAIC approved third party commercial vendor convective storm catastrophe models.~~

Denotes items that must be manually entered on the filing software.

* Items C and D are for informational purposes only.

Capital Adequacy (E) Task Force
RBC Proposal Form

☐ Capital Adequacy (E) Task Force ☒ Health RBC (E) Working Group ☐ Life RBC (E) Working Group
☐ Catastrophe Risk (E) Subgroup ☐ P/C RBC (E) Working Group ☐ Longevity Risk (A/E) Subgroup
☐ Variable Annuities Capital. & Reserve (E/A) Subgroup ☐ Economic Scenarios (E/A) Subgroup ☐ RBC Investment Risk & Evaluation (E) Working Group

DATE: 11/4/2025	**FOR NAIC USE ONLY**
CONTACT PERSON: Derek Noe	Agenda Item # 2025-15-CA-MOD
TELEPHONE: 816-783-8973	Year 2026
EMAIL ADDRESS: dnoe@naic.org	**DISPOSITION**
ON BEHALF OF: Health Risk-Based Capital (E) Working Group	**ADOPTED:**
NAME: Steve Drutz	☐ TASK FORCE (TF) _____
TITLE: Chief Financial Analyst/Chair	☐ WORKING GROUP (WG) _____
AFFILIATION: WA Office of Insurance Commissioner	☐ SUBGROUP (SG) _____
ADDRESS: 5000 Capital Blvd SE	**EXPOSED:**
Tumwater, WA 98501	☐ TASK FORCE (TF) _____
	☒ WORKING GROUP (WG) 2/13/2026
	☐ SUBGROUP (SG) _____
	REJECTED:
	☐ TF ☐ WG ☐ SG _____
	OTHER:
	☐ DEFERRED TO _____
	☒ REFERRED TO OTHER NAIC GROUP
	☐ (SPECIFY) _____

IDENTIFICATION OF SOURCE AND FORM(S)/INSTRUCTIONS TO BE CHANGED

☒ Health RBC Blanks ☒ Property/Casualty RBC Blanks ☒ Life and Fraternal RBC Blanks
☒ Health RBC Instructions ☒ Property/Casualty RBC Instructions ☒ Life and Fraternal RBC Instructions
☒ Health RBC Formula ☒ Property/Casualty RBC Formula ☒ Life and Fraternal RBC Formula
☐ OTHER _____

DESCRIPTION/REASON OR JUSTIFICATION OF CHANGE(S)

Changes to the structure of pages XR013, XR014, PR019, PR020, PR022, PR025, LR019, and LR020 based on the recommendations from the Academy's H-2 Underwriting Risk Report.

The Academy presented their *H2-Underwriting Risk Component and Managed Care Credit Calculation in the Health Risk-Based Capital Formula Report* to the Health Risk-Based Capital Working Group at their April 30, 2025 meeting. The report presented a revised structure to more closely align the underwriting risk pages with the lines of business as presented in the Analysis of Operations of the Health Annual Statement. The report also advised to change the implementation in the Life and Property and Casualty RBC to mirror the line of business changes in Health.

This proposal also implements a new alternative risk charge based on the recommendation from the Academy that the multiple of maximum individual risk be eliminated.

Additional Staff Comments:

LR029 Line (42) and PR022 Line (5) now include Title XVIII Medicare and Title XIX Medicaid as part of total health premium.

Income adjustment factor instructions and values will be updated during the annual Investment Income Adjustment review.

03/11/26 Revisions

Split line 12 into lines 12.1 and 12.2 for more accurate implementation of the standalone investment income factor and updated formulas for line 13.

02/10/26 Revisions

Changes are highlighted in yellow.

Changed numeric references in the health instructions and blanks to match the renumbered lines.

Updated line reference for PR019 to match renumbered lines.

Added description to the PR020 and LR020 line 12 instructions.

Changed verbiage in the instructions for the Alternate Risk Charge

Did not remove lines 1.1, 1.2, and 1.3 from PR020 and LR020 as those lines are used for calculations on other pages. LR019 individual and Group comprehensive were already separated.

**** This section must be completed on all forms.** **Revised 2-2023**

HEALTH PREMIUMS PR019

			Annual Statement Source	(1) Statement Value	Factor		(2) RBC Requirement
	Medical Insurance Premium - Individual						
(1)	Comprehensive (Medical and Hospital)		Earned Premium (U&I Part 1, Column 4 Line 13.1)	0	†		XXX
(2)	Title XVIII Medicare		Earned Premium (U&I Part 1, Column 4 Line 15.6 in part)	0	†		XXX
(3)	Title XIX Medicaid		Earned Premium (U&I Part 1, Column 4 Line 15.5 in part)	0	†		XXX
(4)	Medicare Supplement		Earned Premium (U&I Part 1, Column 4 Line 15.4 in part)	0	†		XXX
(5)	Vision Only		Earned Premium (U&I Part 1, Column 4 Line 15.1 in part)	0	†		XXX
(6)	Dental Only		Earned Premium (U&I Part 1, Column 4 Line 15.2 in part)	0	†		XXX
(7.1)	Stand-Alone Medicare Part D Coverage		Earned Premium (U&I Part 1, Column 4 Line 15.9 in part)	0	†		XXX
(7.2)	Supplemental Benefits within Stand-Alone Part D Coverage (Claims Incurred)		Company Records	0	0.500		0
(7.3)	Medicaid Pass-Through Payments Reported as Premium		Company Records	0	0.020		0
(8)	Hospital Indemnity and Specified Disease		Earned Premium (U&I Part 1, Column 4 Line 15.9 in part)	0	0.035	*	0
(9)	AD&D (Maximum Retained Risk Per Life	0)	Earned Premium (U&I Part 1, Column 4 Line 15.9 in part)	0	‡		0
(10)	Other Accident		Earned Premium (U&I Part 1, Column 4 Line 15 in part)	0	0.050		0
	Medical Insurance Premium - Group and Credit						
(11)	Comprehensive (Medical and Hospital)		Earned Premium (U&I Part 1, Column 4 Line 13.2)	0	†		XXX
(12)	Title XVIII Medicare		Earned Premium (U&I Part 1, Column 4 Line 15.6 in part)	0	†		XXX
(13)	Title XIX Medicaid		Earned Premium (U&I Part 1, Column 4 Line 15.5 in part)	0	†		XXX
(14)	Vision Only		Earned Premium (U&I Part 1, Column 4 Line 15.1 in part)	0	†		XXX
(15)	Dental Only		Earned Premium (U&I Part 1, Column 4 Line 15.2 in part)	0	†		XXX
(16)	Stop Loss and Minimum Premium		Earned Premium (U&I Part 1, Column 4 Line 15.9 in part)	0	¥		0
(17)	Medicare Supplement		Earned Premium (U&I Part 1, Column 4 Line 15.4 in part)	0	†		XXX
(18.1)	Stand-Alone Medicare Part D Coverage (see instructions for limits)		Earned Premium (U&I Part 1, Column 4 Line 15.9 in part)	0	†		XXX
(18.2)	Supplemental benefits within Stand-Alone Part D Coverage (Claims Incurred)		Company Records	0	0.500		0
(18.3)	Medicaid Pass-Through Payments Reported as Premium		Company Records	0	0.020		0
(19)	Hospital Indemnity and Specified Disease		Earned Premium (U&I Part 1, Column 4 Line 15.9 in part)	0	0.035	*	0
(20)	AD&D (Maximum Retained Risk Per Life	0)	Earned Premium (U&I Part 1, Column 4 Line 15.9 in part)	0	‡		0
(21)	Other Accident		Earned Premium (U&I Part 1, Column 4 Line 15 in Part)	0	0.050		0
(22)	Federal Employee Health Benefit Plan		Earned Premium (U&I Part 1, Column 4 Line 15.8)	0	0.000		0
	Disability Income Premium						
(23)	Noncancellable Disability Income - Individual Morbidity		Earned Premium (U&I Part 1, Column 4 Line 15.3 in part)	0	‡		0
(24)	Other Disability Income - Individual Morbidity		Earned Premium (U&I Part 1, Column 4 Line 15.3 in part)	0	‡		0
(25)	Disability Income - Credit Monthly Balance Plans		Earned Premium (U&I Part 1, Column 4 Line 15.3 in part)	0	‡		
(26)	Disability Income - Group Long-Term		Earned Premium (U&I Part 1, Column 4 Line 15.3 in part)	0	‡		0
(27)	Disability Income - Credit Single Premium with Additional Reserve		Earned Premium (U&I Part 1, Column 4 Line 15.3 in part)	0	‡		0
(28)	Disability Income - Credit Single Premium without Additional Reserve		Earned Premium (U&I Part 1, Column 4 Line 15.3 in part)	0	‡		0
(29)	Disability Income - Group Short-Term		Earned Premium (U&I Part 1, Column 4 Line 15.3 in part)	0	‡		0
(30)	Total Disability Income		Earned Premium (U&I Part 1, Column 4 Line 15.3)	0			
	Long-Term Care						
(31)	Noncancellable Long-Term Care Premium - Rate Risk**		Earned Premium (U&I Part 1, Column 4 Line 15.7 in part)	0	0.100		0
(32)	Other Long-Term Care Premium ‡ ‡		Earned Premium (U&I Part 1, Column 4 Line 15.7 in part)	0	0.000		0 ‡ ‡
(33)	Total Long-Term Care		Earned Premium (U&I Part 1, Column 4 Line 15.7)	0			
	Health Premium with Limited Underwriting Risk						
(34)	ASC Business with Premium Revenue		Earned Premium (U&I Part 1, Column 4 Line 15.9 in part)	0	0.000		0
	Other Health						
(35)	Other Health		Earned Premium (U&I Part 1, Column 4 Line 14 and 15.9 in part)	0	0.120		0
(36)	Total Earned Premiums		Sum of Lines (1) through (22), Line (30), and Lines (33) through (35) minus Lines (7.3) and (18.3)	0			0
	C(1), L(36) should equal U&I Part 1 Column 4 Lines 13.1 through 15.9						
(37)	Additional Reserves for Credit Disability Plans		Company records	0	§		
(38)	Additional Reserves for Credit Disability Plans, prior year		Company records	0	§		

† The premium amounts in these lines are transferred to PR020 Underwriting Risk – Premium Risk for Comprehensive Medical, Medicare Supplement, Dental & Vision and Stand-Alone Medicare Part D Coverage Lines (1.1) and (1.2) for the calculation of risk-based capital. The premium amounts are included here to assist in the balancing of total health premium. If managed care arrangements have been entered into, the company may also complete PR021 Underwriting Risk – Managed Care Credit. In which case, the company will also need to complete PR013 Health Credit Risk in the formula. If there are amounts in any of lines (1) through (6), (11) through (15), and (17) on page PR019 Health Premiums, the company will also be directed to complete the Health Administrative Expense portion of PR023.

‡ The two tiered calculation is illustrated in the risk-based capital instructions for PR019 Health Premiums.

‡ ‡ The balance of the RBC requirement for Long Term Care - Morbidity Risk is calculated on Page PR023. The premium is shown to allow totals to check to U&I Part 1.

* If there is premium included on either or both of these lines, the RBC value in Column (2) will include 3.5% of such premium and $50,000 (included in the line with the larger premium).

** The factor applies to all Noncancellable premium.

§ These amounts are used to adjust the premium base for single premium credit disability plans that carry additional tabular reserves.

¥ A factor of .350 will be applied to the first $25,000,000 in Column (1), Line (16) and a factor of .250 will be applied to the remaining premium in excess of $25,000,000.

Denotes items that must be manually entered on the filing software.

UNDERWRITING RISK - PREMIUM RISK FOR COMPREHENSIVE MEDICAL, MEDICARE SUPPLEMENT AND DENTAL & VISION PR020

(Experience Fluctuation Risk in Life RBC Formula)

		(1) Comprehensive Medical Individual	(2) Comprehensive Medical Group	(3) Title XVIII-Medicare	(4) Title XIX-Medicaid	(5) Medicare Supplement	(6) Vision Only	(7) Dental Only	(8) Stand-Alone Medicare Part D Coverage	(9) TOTAL
(1.1)	Individual Premium	0	0	0	0	0	0	0	0	0
(1.2)	Group Premium	0	0	0	0	0	0	0	0	0
(1.3)	Total Premium	0	0	0	0	0	0	0	0	0
(2)	Other Health Risk Revenue†	0	0	0	0	XXX	0	0	0	0
(3)	Medicaid Pass-Through Payments Reported as Premium	XXX	XXX	XXX	0	XXX	XXX	XXX	XXX	0
(4)	Underwriting Risk Revenue = Lines (1.3) + (2) - (3)	0	0	0	0	0	0	0	0	0
(5)	Net Incurred Claims	0	0	0	0	0	0	0	0	0
(6)	Medicaid Pass-Through Payments Reported as Claims	XXX	XXX	XXX	0	XXX	XXX	XXX	XXX	0
(7)	Fee-for-Service Offset†	0	0	0	0	XXX	0	0	0	0
(8)	Underwriting Risk Incurred Claims = Lines (5) – (6) – (7)	0	0	0	0	0	0	0	0	0
(9)	Underwriting Risk Claim Ratio (8)/(4)	0	0	0	0	0	0	0	0	XXX
(10)	Underwriting Risk Factor for Initial Amounts Of Premium‡	0.1440	0.1440	0.1440	0.1440	0.0987	0.1153	0.1153	0.251	XXX
(11)	Underwriting Risk Factor for Excess of Initial Amount‡	0.0844	0.0844	0.0844	0.0844	0.0609	0.0716	0.0716	0.151	XXX
(12.1)	Investment Income Adjustment Factor Initial Premium	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	XXX	XXX
(12.2)	Investment Income Adjustment Factor Excess Premium	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	XXX	XXX
(13)	Composite Underwriting Risk Factor	A1	A1	A1	A1	A2	A2	A2	A3	XXX
(14)	Base Underwriting Risk RBC = Line (4) x Line (9) x Line (13)	0	0	0	0	0	0	0	0	XXX
(15)	Managed Care Discount Factor = PR021 Line (12)	0	0	0	0	0	0	0	0	XXX
(16)	Base RBC After Managed Care Discount = Line (14) x Line (15)	0	0	0	0	0	0	0	0	0
(17)	Alternate Risk Charge	500,000	500,000	500,000	500,000	50,000	50,000	50,000	150,000	XXX
(18)	Net Alternate Risk Charge	B0	B0	B0	B0	B1	B2	B2	B3	0
(19)	Net Underwriting Risk RBC (Maximum of Line (16) or Line (18))	0	0	0	0	0	0	0	0	0

† Source is company records unless already included in premiums.

Initial Premium Amount‡							
Comprehensive (Hospital & Medical) - Individual	Comprehensive (Hospital & Medical) - Group	Title XVIII - Medicare	Title XIX - Medicaid	Medicare Supplement	Vision	Dental	Stand-Alone Medicare Part D Coverage
$25,000,000	$25,000,000	$25,000,000	$25,000,000	$3,000,000	$3,000,000	$3,000,000	$25,000,000

~~§ Formula applies only to Column (1), for all other columns Line (14) should equal Line (13).~~

~~* The Line (17) Alternate Risk Charge is calculated as follows:~~

~~£ Applicable only if Line (16) for a column equals Line (16) for Column (5), otherwise zero.~~

Denotes items that must be manually entered on the filing software.

PR020 Formulas

Cell Label	Formula
A1	={{Min[Line (4) x Line (10), 25,000,000 x Line (10)] x Line (12.1)}+ {Max[0, (Line (4) - 25,000,000) x Line (11)] x Line (12.2)}} / Line (4)
A2	={{Min[Line (4) x Line (10), 3,000,000 x Line (10)] x Line (12.1)} + {Max[0, (Line (4) - 3,000,000) x Line (11)] x Line (12.2)}} / Line (4)
A3	={Min[Line (4) x Line (10), 25,000,000 x Line (10)] + Max[0, (Line (4) - 25,000,000) x Line (11)] } / Line (4)
B0	=If[OR[Line (4) > 0, Line (8) > 0], 500,000, 0]
B1	=If[OR[Line (4) > 0, Line (8) > 0], Max[0, 50,000 - C(1) L(18) - C(2) L(18) - C(3) L(18) - C(4) L(18)], 0]
B2	=If[OR[Line (4) > 0, Line (8) > 0], Max[0, 50,000 - C(1) L(18) - C(2) L(18) - C(3) L(18) - C(4) L(18) - C(5) L(18)], 0]
B3	=If[OR[Line (4) > 0, Line (8) > 0], Max[0, 150,000 - C(1) L(18) - C(2) L(18) - C(3) L(18) - C(4) L(18) - C(5) L(18) - C(6) L(18) - C(7) L(18)], 0]

UNDERWRITING RISK - OTHER AND TOTAL NET HEALTH PREMIUM RBC PR022

			(1) Amount	Factor	(2) RBC Requirement
	Rate Guarantees & Federal Employees Health Benefits	Data Source			
(1)	Business with Rate Guarantees Between 15-36 Months	Company Records	0	0.024	0
(2)	Business with Rate Guarantees Over 36 Months	Company Records	0	0.064	0
(3)	Federal Employees Health Benefit Program (FEHBP) Claims Incurred	Company Records	0	0.020	0
(4)	Total, Rate Guarantees & Federal Employees Health Benefits	L(1) + L(2) + L(3)	0		0
	Administrative Expenses for Certain A&H Coverages				
(5)	Total Accident and Health Premiums	PR019 Health Premiums Column (1) Line (**36**)	0		
(6)	Accident and Health Premiums from Underwriting Risk	PR020 Underwriting Risk Column (**9**) Line (**1.3**)	0		
(7)	Accident and Health Premiums Factor	L(6)/L(5)	0.000		
(8)	Administrative Expenses for Health Insurance	Company Records	0		
(9)	Less Administrative Expenses for Administrative Service Contracts (ASC) included in Line (8)	Company Records	0		
(10)	Less Administrative Expenses for Administrative Services Only (ASO) Business included in Line (8)	Company Records	0		
(11)	Less Administrative Expenses for Commissions and Premium Taxes	Company Records	0		
(12)	Net Administrative Expenses	L(8) - L(9) - L(10) - L(11)	0		
(13)	Composite Health Administrative Expense Risk Factor	(7% of L(6) up to $25 million + 4% of excess)/L(6)	0.000		
(14)	Administrative Expense Component for Health	L(12) x L(7) x L(13)			0
	Health ASO/ASC				
(15)	Administrative Expenses for ASC Business	Company Records*	0	0.020	0
(16)	Administrative Expenses for ASO Business	Company Records*	0	0.020	0
(17)	Total Health ASO/ASC	L(15) + L(16)	0		0
(18)	Total Underwriting Risk - Other	L(4) + L(14) + L(17)			0
	Total Net Health Premium RBC				
(19)	Total Health Premium RBC	L(18) + PR019 C(2) L(**36**) + PR020 C(**9**) L(**19**)			
(20)	Premium Concentration Factor	PR018 C(20) L(14)			1.000
(21)	Total Net Health Premium RBC	L(19) x L(20)			0

* Line (15) should be greater than or equal to Line (9). Line (16) should be greater than or equal to Line (10).

Denotes items that must be manually entered on the filing software.

PREMIUM STABILIZATION RESERVES PR025

		Data Source	(1) Statement Value	Factor	(2) RBC Requirement
	Group & Credit Health Premium Stabilization Reserves Reported				
(1)	Stabilization Reserves and Experience Rating Refunds	Company Records	0	0.500	0
(2)	Provision for Experience Rating Refunds	Company Records	0	0.500	0
(3)	Reserve for Group Rate Credits	Company Records	0	0.500	0
(4)	Reserve for Credit Rate Credits	Company Records	0	0.500	0
(5)	Premium Stabilization Reserves	Company Records	0	0.500	0
(6)	Total of Preliminary Premium Stabilization Reserve Credit	Sum of Lines (1) through (5)	0		0
	Group & Credit Health Risk-Based Capital				
(7)	Maximum Risk-Based Capital	PR024 Health Claim Reserves Column (2) Line (2) + PR019 Health Premiums Column (2) Lines **(16), (19), (20), (21), (25), (26), (27), (28) and (29)** + [PR020 Underwriting Risk- Premiums Risk **Column (9) Line (19) - Column (8) Line (19)** x **Column (9) Line (1.2) / Column (9) Line (1.3)**]	0		
(8)	Final Premium Stabilization Reserve Credit	Column (2) Line (6), but not more than Column (1) Line (7)	0	-1.000	0

Denotes items that must be manually entered on the filing software.

LRBC FORMULA APPLICATION FOR P&C COMPANY'S A&H BUSINESS
PR019 – PR026

If the reporting company writes 5% or more of its premiums in A&H lines in 2024~~3~~, 2025~~4~~ or 2026~~5~~, this section of the formula must be completed. To determine if that applies, take the sum of Lines 13, 14 and 15 of the Underwriting and Investment Exhibit Part 1B Column 6 and divide by Line 35 Column 6, and round to three decimals for each individual year. If the result is at least 0.050 in any year, this exhibit and the appropriate Schedule P adjustment must be completed.

If the company writes less than 5% of its premiums in A&H lines in 2024~~3~~, 2025~~4~~ and 2026~~5~~, disregard this section.

PR019 - Health Premiums

Basis of Factors

Risk-based capital factors for health insurance are applied to medical, disability income, long-term care insurance and other types of health insurance premiums and claim reserves with an offset for premium stabilization reserves. For health coverage that does not fit into one of the defined categories for risk-based capital, the "Other Health" category is to be used.

Medical Insurance Premium

The business is subdivided by product into categories for individual coverages and for group and credit coverages depending on the risk related to volatility of claims. The factors were developed from a model that determines the minimum amount of surplus needed to protect the company against a worst-case scenario for each type of coverage. The results of the model were then translated into either a uniform percentage or a two-tier formula to be applied to premium. The two-tier formula reflects the decreased risk of a larger in-force block. The formula includes several changes starting in 1999 for some types of health insurance. These changes add several additional worksheets and are designed to keep the RBC amounts for health coverage consistent regardless of the RBC formula used. If the company has Comprehensive Medical business, Medicare Supplement, Dental & Vision business, or Stand-Alone Medicare Part D coverage through a PDP arrangement, it will be directed to these additional worksheets. The instructions for including paid health claims in the various categories of the Managed Care Discount Factor Calculation can be found in the instructions to PR021 Underwriting Risk – Managed Care Credit. Appendix 1 - Commonly Used Health Insurance Terms haves been added to these instructions. Appendix 2 of these instructions lists commonly used terms of Stand-Alone Medicare Part D coverage. If the company has any of the three mentioned types of medical insurance, it will also be required to complete additional parts of the formula for Health Credit Risk (PR013) and Health Administrative Expenses portion in PR022.

Disability Income Premium

Prior to 2001, the individual disability income factors were based on models of the disability risk completed by several companies with significant experience in this line. The group long-term disability income risk was modeled based on methodology similar to that used by one of the largest writers of this business. The pricing risk was addressed principally as the delayed reaction to increases in incidence of new claims and to the lengthening of claims from slower recoveries than assumed.

Starting in 2001, new categories and new factors are applicable to all types of disability income premiums. These factors are based on new data and apply a model similar to that used for other health premium risk to that data.

All premium should be reported on a net of reinsurance basis.

Specific Instructions for Application of the Formula

The total of all earned premium categories PR019 Health Premiums, Line (3626), Column (1) should equal the total in ~~Schedule H~~ Underwriting and Investment Exhibit, Part 1, Line 13.1 through 15.92, Column 41 of the Annual Statement. Earned premium for each of these coverages should be from underlying company records. Earned premium may be reported in ~~Schedule H~~Underwriting and Investment Exhibit for Administrative Services Contract (ASC) and/or the Federal Employees Health Benefit Program (FEHBP) which are included in order that Line (3626) will equal the total in ~~Schedule H~~Underwriting and Investment Exhibit. As such, there is no RBC factor applied to any premium reported on lines (2214), (3223)

or (3424). For some of the coverages, two tier formulas apply. The calculations for these coverages shown below will not appear on the RBC filing software but will automatically be calculated by the software.

Line (1)
Health premiums for comprehensive (medical and hospital), which includes expense reimbursement hospital/medical coverage) written on individual contracts are entered in Column (1) for this line, but no RBC Requirement is calculated in Column (2). The premiums are carried forward to page PR020 Underwriting Risk – Premium Risk for Comprehensive Medical, Medicare Supplement and Dental & Vision, Column (1) Line (1.1). ~~Medicaid Pass-Through Payments reported as premium in the annual statement filing should be excluded from the premium amounts reported in Line 1 and reported in Line (3.3) and (10.3), respectively.~~

Line (2)
Health premiums for Title XVIII Medicare written on individual contracts are entered in Column (1) for this line, but no RBC Requirement is calculated in Column (2). The premiums are carried forward to page PR020 Underwriting Risk – Premium Risk for Comprehensive Medical, Medicare Supplement and Dental & Vision, Column (3) Line (1.1).

Line (3)
Health premiums for Title XIX Medicaid written on individual contracts are entered in Column (1) for this line, but no RBC Requirement is calculated in Column (2). The premiums are carried forward to page PR020 Underwriting Risk – Premium Risk for Comprehensive Medical, Medicare Supplement and Dental & Vision, Column (4) Line (1.1).

Line (42)
Health premiums for Medicare supplement written on individual contracts are entered in Column (1) for this line, but no RBC Requirement is calculated in Column (2). The premiums are carried forward to page PR020 Underwriting Risk – Premium Risk for Comprehensive Medical, Medicare Supplement and Dental & Vision, Column (52) Line (1.1).

Line (53)
Health premiums for ~~dental or~~ vision only coverage written on individual contracts are entered in Column (1) for this line, but no RBC Requirement is calculated in Column (2). The premiums are carried forward to page PR020 Underwriting Risk – Premium Risk for Comprehensive Medical, Medicare Supplement and Dental & Vision, Column (63) Line (1.1).

Line (6)
Health premiums for dental only coverage written on individual contracts are entered in Column (1) for this line, but no RBC Requirement is calculated in Column (2). The premiums are carried forward to page PR020 Underwriting Risk – Premium Risk for Comprehensive Medical, Medicare Supplement and Dental & Vision, Column (7) Line (1.1).

Line (73.1)
Health premium for Stand-Alone Medicare Part D coverage written on individual contracts - includes beneficiary premium (standard coverage portion), direct subsidy, low-income subsidy (premium portion), Part D Payment Demonstration amounts and risk corridor payment adjustments. See Appendix 2 for definition of these terms. This does not include Medicare-Advantage prescription drug coverage (MA-PD) premiums which are to be included in Line (21). No RBC requirement is calculated in Column (2). The premium is carried forward to page PR020 Underwriting Risk – Premium Risk for Comprehensive Medical, Medicare Supplement and Dental & Vision, Column (84) Line (1.1).

Line (73.2)
Health incurred claims for Supplemental benefits within Stand-Alone Medicare Part D coverage written on individual contracts that is beneficiary payment (supplemental benefit portion) – e.g., coverage in the coverage gap, use of co-pays of less value than the minimum regulatory coinsurance and reduced deductible. This does not include the low-income subsidy (cost sharing portion) which is not a component of reported revenue. RBC is calculated for Supplemental benefits within Stand-Alone Medicare Part D Coverage on PR019.

Line (73.3)
Medicaid pass-through payments reported as premium ~~and excluded from Line (1) should be reported in Line (3.3)~~.

Line (84) and Line (191)
There is a factor for certain types of limited benefit coverage (Hospital Indemnity, which includes a per diem for intensive care facility stays, and Specified Disease) which includes both a percent of earned premium on such insurance (3.5%) and a flat dollar amount ($50,000) to reflect the higher variability of small amounts of business.

Line (95) and Line (2012)
There is a factor for accidental death and dismemberment (AD&D) insurance (where a single lump sum is paid) which depends on several items:

1. The maximum amount of retained risk for any single claim;
2. $300,000 if three times the maximum amount of retained risk is larger than $300,000;
3. 5.5% of earned premium to the extent the premium for AD&D is less than or equal to $10,000,000; and
4. 1.5% of earned premium in excess of $10,000,000.

There are places for reporting the total amount of earned premium and the maximum retained risk on any single claim. The actual RBC amount will be calculated automatically as the sum of (a) the lesser of items 1 and 2; plus (b) items 3 plus 4.

Line (106) and Line (2113)
A 5% factor for Other Accident coverage provides for any accident based contingency other than those contained in Lines (95) or (2012). For example, this line should contain all the premium for policies that provide coverage for accident only disability or accident only hospital indemnity. The premium for policies that contain AD&D in addition to other accident only benefits should be shown on this line.

Line (117)
Health premiums for comprehensive (medical and hospital), which includes expense reimbursement hospital/medical coverage) written on group contracts are entered in Column (1) for this line, but no RBC Requirement is calculated in Column (2). The premiums are carried forward to page PR020 Underwriting Risk – Premium Risk for Comprehensive Medical, Medicare Supplement and Dental & Vision, Column (21) Line (1.2).

Line (12)
Health premiums for Title XVIII Medicare written on individual contracts are entered in Column (1) for this line, but no RBC Requirement is calculated in Column (2). The premiums are carried forward to page PR020 Underwriting Risk – Premium Risk for Comprehensive Medical, Medicare Supplement and Dental & Vision, Column (3) Line (1.2).

Line (13)
Health premiums for Title XIX Medicaid written on individual contracts are entered in Column (1) for this line, but no RBC Requirement is calculated in Column (2). The premiums are carried forward to page PR020 Underwriting Risk – Premium Risk for Comprehensive Medical, Medicare Supplement and Dental & Vision, Column (4) Line (1.2).

Line (148)
Health premiums for ~~dental or~~ vision only coverage written on group contracts are entered in Column (1) for this line, but no RBC Requirement is calculated in Column (2). The premiums are carried forward to page PR020 Underwriting Risk – Premium Risk for Comprehensive Medical, Medicare Supplement and Dental & Vision, Column (63) Line (1.2).

Line (15)
Health premiums for dental only coverage written on group contracts are entered in Column (1) for this line, but no RBC Requirement is calculated in Column (2). The premiums are carried forward to page PR020 Underwriting Risk – Premium Risk for Comprehensive Medical, Medicare Supplement and Dental & Vision, Column (7) Line (1.2).

Line (169)
The American Academy of Actuaries submitted a report to the Health Risk-Based Capital (E) Working Group in 2016 to apply a tiered risk factor approach to the Stop-Loss Premium. The premiums for this coverage should not be included within Comprehensive Medical or Other Health Coverages (Line (325)). It is not expected that the transfer of risk through the various managed care credits will reduce the risk of stop-loss coverage. Medical Stop-Loss exhibits a much higher variability than Comprehensive Medical. A factor of 35% will be applied to the first $25,000,000 in premium and a factor of 25% will be applied to the premium in excess of $25,000,000. Stop-loss premiums should be reported on a net basis.

Line (170)
Health premiums for Medicare supplement written on group contracts are entered in Column (1) for this line, but no RBC Requirement is calculated in Column (2). The premiums are carried forward to page PR020 Underwriting Risk – Premium Risk for Comprehensive Medical, Medicare Supplement and Dental & Vision, Column (52) Line (1.2).

Line (180.1)
Health premium for Stand-Alone Medicare Part D coverage written on group contracts only if the plan sponsor has risk corridor protection for the contracts - includes beneficiary premium (standard coverage portion), direct subsidy, low-income subsidy (premium portion), Part D Payment Demonstration amounts and risk corridor protection payments. See Appendix 2 for definition of these terms. Stand-Alone Medicare Part D coverage written on group contracts without risk corridor protection is reported in Line (325) Other Health. This does not include Medicare-Advantage prescription drug coverage (MA-PD) premiums which are to be included in Line (169). No RBC requirement is calculated in Column (2). The premium is carried forward to page PR020 Underwriting Risk – Premium Risk for Comprehensive Medical, Medicare Supplement and Dental & Vision, Column (84) Line (1.2).

Line (180.2)
Health Incurred Claims for Supplemental benefits within Stand-Alone Medicare Part D coverage written on group contracts that is beneficiary payment (supplemental benefit portion) – e.g., coverage in the coverage gap, use of co-pays of less value than the minimum regulatory coinsurance and reduced deductible where the plan sponsor has risk corridor protection for the group contract's standard benefit design coverage. This does not include the low-income subsidy (cost-sharing portion) which is not a component of reported revenue. RBC is calculated for Supplemental benefits within Part D Coverage on PR019.

Line (180.3)
Medicaid pass-through payments reported as premium ~~and excluded from Line (7) should be reported in Line (10.3)~~.

Lines (2315) through (3424)

Disability income premiums are to be separately entered depending on category (Individual and Group). For Individual, a further split is between noncancellable (NC) or other (GR, etc.) For Group, the further splits are between Credit Monthly Balance, Credit Single Premium (with additional reserves), Credit Single Premium (without additional reserves), Group Long-Term (benefit periods of two years or longer) and Group Short-Term (benefit periods less than two years). For long-term care insurance, premiums are reported separately for Individual noncancellable, Individual (other than NC) and Group LTCI. The RBC factors vary by the amount of premium reported such that a higher factor is applied to amounts below $50,000,000 for similar types. Starting in 2001, in determining the premiums subject to the higher factors, individual disability income noncancellable and other is combined. All types of Group and Credit are combined in a different category from Individual. For long-term care, all types (Individual and Group) are combined.

The following table describes the calculation process used to assign RBC charges to disability income business. The reference to line numbers (e.g., Line 2315) represent the actual line numbers used in the formula page, but the subdivisions of those lines [e.g., a), b), etc.] do not exist in the formula page. The total RBC Requirement shown in the last (Total) subdivision of each line will be included in Column (2) for that line in the formula page.

	Disability Income Premium	Annual Statement Source	Statement Value	Factor	RBC Requirement
Line (2315)	Noncancellable Disability Income - Individual Morbidity	Earned Premium included in U&I Part 1, Column 4 Line 15.3 ~~Schedule H, Part 1, Column 21, Line 2,~~ in part			
a)	First $50 Million Earned Premium of Line (2315)	Company Records		X 0.350 =	
b)	Over $50 Million Earned Premium of Line (2315)	Company Records		X 0.150 =	
c)	Total Noncancellable Disability Income - Individual Morbidity	a) of Line (2315) + b) of Line (2315), Column (2)			
Line (2416)	Other Disability Income – Individual Morbidity	Earned Premium included in U&I Part 1, Column 4 Line 15.3 ~~Schedule H, Part 1, Column 21, Line 2,~~ in part			
a)	Earned Premium in Line (2416) [up to $50 million less premium in a) of Line (2315)]	Company Records		X 0.250 =	
b)	Earned Premium in Line (2416) not included in a) of Line (2416)	Company Records		X 0.070 =	
c)	Total Other Disability Income - Individual Morbidity	a) of Line (2416) + b) of Line (2416), Column (2)			
Line (2517)	Disability Income - Credit Monthly Balance	Earned Premium included in U&I Part 1, Column 4 Line 15.3 ~~Schedule H, Part 1, Column 21, Line 2,~~ in part			
a)	First $50 Million Earned Premium of Line (2517)	Company Records		X 0.200 =	
b)	Over $50 Million Earned Premium of Line (2517)	Company Records		X 0.030 =	
c)	Total Disability Income - Credit Monthly Balance	a) of Line (2517) + b) of Line (2517), Column (2)			
Line (2618)	Disability Income – Group Long Term	Earned Premium included in U&I Part 1, Column 4 Line 15.3 ~~Schedule H, Part 1, Column 21, Line 2,~~ in part			
a)	Earned Premium in Line (2618) [up to $50 million less premium in a) of Line (2517)]	Company Records		X 0.150 =	
b)	Earned Premium in Line (2618) not included in a) of Line (2618)	Company Records		X 0.030 =	
c)	Total Disability Income – Group Long Term	a) of Line (2618) + b) of Line (2618), Column (2)			

		Annual Statement Source	Statement Value	Factor	RBC Requirement
	Disability Income Premium				
Line (27~~19~~)	Disability Income - Credit Single Premium with Additional Reserves	Earned Premium included in U&I Part 1, Column 4 Line 15.3~~Schedule H, Part 1, Column 21, Line 2,~~ in part. This amount to be reported on Health Premiums, Line (27~~19~~)			
a)	Additional Reserves for Credit Disability Plans	PR019 Health Premiums Column (1) Line (37~~27~~)			
b)	Additional Reserves for Credit Disability Plans, Prior Year	PR019 Health Premiums Column (1) Line (38~~28~~)			
c)	Subtotal Disability Income - Credit Single Premium with Additional Reserves	Line (27~~19~~) - a) of Line (27~~19~~) + b) of Line (27~~19~~)			
d)	Earned Premium in c) [up to $50 million less premium in a) of Line (25~~17~~) + a) of Line (26~~18~~)]	Company Records		X 0.100 =	
e)	Earned Premium in c) of Line (27~~19~~) not included in d) of Line (27~~19~~)	Company Records		X 0.030 =	
f)	Total Disability Income - Credit Single Premium with Additional Reserves	d) of Line (27~~19~~) + e) of Line (27~~19~~), Column (2)			
Line (28~~0~~)	Disability Income – Credit Single Premium without Additional Reserves	Earned Premium included in U&I Part 1, Column 4 Line 15.3~~Schedule H, Part 1, Column 21, Line 2,~~ in part			
a)	Earned Premium in Line (28~~0~~) [up to $50 million less premium in a) of Line (25~~17~~) + a) of Line (26~~18~~) + d) of Line (27~~19~~)]	Company Records		X 0.150 =	
b)	Earned Premium in Line (28~~0~~) not included in a) of Line (28~~0~~)	Company Records		X 0.030 =	
c)	Total Disability Income – Credit Single Premium without Additional Reserves	a) of Line (28~~0~~) + b) of Line (28~~0~~), Column (2)			
Line (29~~1~~)	Disability Income – Group Short Term	Earned Premium included in U&I Part 1, Column 4 Line 15.3~~Schedule H, Part 1, Column 21, Line 2,~~ in part			
a)	Earned Premium in Line (29~~1~~) [up to $50 million less premium in a) of Line (25~~17~~) + a) of Line (26~~18~~) + d) of Line (27~~19~~) + a) of Line (28~~0~~)]	Company Records		X 0.050 =	
b)	Earned Premium in Line (29~~1~~) not included in a) of Line (29~~1~~)	Company Records		X 0.030 =	
c)	Total Disability Income – Group Short Term	a) of Line (29~~1~~) + b) of Line (29~~1~~), Column (2)			
Line (31~~22~~)	Noncancellable Long-Term Care Premium – Rate risk	Earned Premium (U&I Part 1, Column 4 Line 15.7~~Schedule H, Part 1, Column 23, Line 2~~, in part)		X 0.100 =	

Line (~~2~~35)

Most Health Premium will have been included in one of the prior lines. In the event that some coverage does not fit into any of these categories, "Other Health" category is applied with a 12% factor, which is from 1998 formula for Other Limited Benefits Anticipating Rate Increases. Stop-loss premiums are addressed separately in Line (16~~9~~).

Stop-Loss Electronic-Only Tables

The Health Risk-Based Capital (E) Working Group revised the stop-loss factors in 2017. The American Academy of Actuaries submitted a report to the Health Risk-Based Capital (E) Working Group and suggested that the factors be revised based on data from 1998-2008. The Health Risk-Based Capital (E) Working Group agreed to continue analyzing the stop-loss factors as a result of the changes to life-time maximum amounts included in the Federal Affordable Care Act.

Electronic Table 1 – Stop-Loss Interrogatories

The interrogatories are designed to gather the information by product type and will be reviewed on a go-forward basis. The data will be used in the continued evaluation of the factors. The data collected will be collected on a one-year run-out basis. For example, the RBC filed at year-end **2018**, will reflect the incurred data for calendar year **2017** run-out through December 31, **2018**.

For those insurers where the stop-loss gross premium written is both under $2,000,000 and is less than 10% of the insurer's total gross premium written are exempt from completing Table 1.

The categories used in the interrogatories are separated as follows:

Product Type

Specific Stop-Loss (including aggregating specific) = This coverage was included in the 1998 to 2008 factor development.
Aggregate Stop-Loss = This coverage was included in the 1998 to 2008 factor development.
HMO Reinsurance = Specific reinsurance of an HMO's commercial, Medicare, Medicaid or Point of Service products. This coverage was not included in the 1998 to 2008 factor development.
Provider Excess = Specific excess written on Providers including IPAs, hospitals, clinics. This coverage was not included in the 1998 to 2008 factor development.
Medical Excess Reinsurance = Specific reinsurance of an insurance company's medical business (first dollar or self-insured). This coverage was not included in the 1998 to 2008 factor development.

Please do not include quota share or excess reinsurance written on stop-loss business.

Calendar Year - Submit experience information for the calendar year preceding the year for which the RBC report is being filed; e.g., the RBC report filed for **2019** should provide experience information for calendar year **2018** with run-out through December 31, **2019**. If the contract year does not follow a calendar year (e.g., 7/1-6/30), the impact on the interrogatories would be spread across two years in the same manner it would be reported in two annual statements (i.e., half of premium and the applicable portion of the liability/expense would hit the first year, the remainder would hit the second year). Report based on the calendar year even if the calendar year includes two separate contracts (For example: Contract 1 started on 7/1/2017 and ran through 6/30/2018. Contract 2 started on 7/1/2018 and ran through 6/30/2019. The 2018 calendar year experience information would be comprised of the experience information in Contract 1 from 1/1/2018 through 6/30/2018 AND Contract 2 from 7/1/2018 to 12/31/2018.). Contracts that do not follow a calendar year should NOT be excluded.

Total [Gross/Net] Premium - This is the [gross/net] premium revenue, [before/after] ceded reinsurance and including commissions. Report the data as reported for the prior calendar year including amounts paid for the prior year through the end of the current calendar year. Do not adjust for any anomalies in the experience.
Total Gross Claims + Expenses =

Total Gross Claims - These are the gross incurred claims, before ceded reinsurance. Do not adjust for any anomalies in the experience. Claims are defined as claims incurred during prior calendar year and paid through the end of the current calendar (reporting) year, plus any remaining gross claim liability. .

+

Expenses – These are the gross incurred expense during the prior calendar year and paid through the end of the current reporting year plus any incurred expenses that are unpaid as of the end of the run-out period. Premium tax amounts should be included in the expense amounts; however, income taxes would be excluded.

Gross Combined Ratio - This is equal to (Total Gross Claims + Expenses) / Total Gross Premium.

Premiums Net of Reinsurance – This is the net premium revenue, net of reinsurance. Report data as reported in the annual statement and do not adjust for any anomalies in the experience.

Total Net Claims + Expenses =

Total Net Claims - These are the net incurred claims after ceded reinsurance. Do not adjust for any anomalies in the experience. Claims are defined as claims incurred during prior calendar year and paid through the end of the current calendar (reporting) year, plus any remaining net claim liability.

+

Expenses – These are the net incurred expenses during the prior calendar year and paid through the end of the current reporting year plus any incurred expenses that are unpaid as of the end of the run-out period. Premium tax amounts should be included in the expense amounts; however, income taxes would be excluded.

Net Combined Ratio – This is equal to (Total Net Claims + Expenses)/Premiums Net of Reinsurance.

Table 2a – Calendar Year Specific Stop-Loss Contracts by Group Size and Table 2b – Calendar Year Aggregate Stop-Loss Contract by Group Size

For those insurers where the stop-loss gross premium written is both under $2,000,000 and is less than 10% of the insurer's total gross premium written are exempt from completing Table 2.

Table 2a should reflect the specific stop-loss data and Table 2b should reflect the aggregate stop-loss data.

Report the number of groups, average specific attachment point and average aggregate attachment as of December 31st of the calendar (reporting) year. If the contract does not follow a calendar year (e.g. 7/1-6/30), report the policies written during the year of the annual statement and in effect at the end of the calendar year.

The number of covered lives in a group (group size) should be based on the size of the group as of December 31 of the calendar year. The number of covered lives counted should include all enrolled members (that is, total number of lives insured, including dependents).

Number of Groups – list the number of groups for each stop-loss contract based on the number of covered lives in the group.

Average Specific Attachment Point (Table 2a) - The average should be weighted by the number of covered lives in the respective group size bracket, excluding the count of covered lives within the denominator where specific/aggregate coverage was not provided.

Example: Average Specific Attachment Point ($) (Table 2a, 50-99 Covered Lives in Group) =

(Sum of Specific Attachment Points X Reported Lives) / (Sum of Reported Lives)

Insured Group	Specific Att Point ($)	Aggregate Att (%)	Number of Lives	Include Exclude	Reason to Exclude
1	$ 200,000	115%	90	Include	
2	$ 100,000	120%	60	Include	
3	$ 50,000	140%	40	Exclude	Not in Group Size Band
4	$ 120,000	N/A	50	Include	

Calculation: (200,000 x 90 + 100,000 x 60 + 120,000 x 50) / (90 + 60 + 50)

= $150,000

Average Aggregate Attachment Percentage (Table 2b) – Is based on expected claims. Subgroups that have separate stop-loss contracts should be aggregated in terms of determining the group size. The average should be weighted by expected claims in the respective group size bracket, excluding the expected claims within the denominator where aggregate coverage was not provided.

Example: Average Aggregate Attachment Percentage (%) (Table 2b, 50-99 Covered Lives in Group) =
(Sum of Expected Claims x Attachment Percentage %) / (Sum of Expected Claims)

Insured Group	Specific Att Point ($)	Aggregate Att (%)	Expected Claims	Number of Lives	Include Exclude
1	$ 200,000	115%	$ 500,000	90	Include
2	$ 100,000	120%	$ 300,000	60	Include
3	$ 50,000	140%	$ 200,000	40	Exclude
4	$ 120,000	N/A	$ 400,000	50	Exclude

Calculation: (500,000 x 115% + 300,000 x 120%) / (500,000 + 300,000)
= 116.7%

Footnote – The number of covered lives for stop-loss coverage is reported in the Accident and Health Policy Experience Exhibit for Year (April 1st filing) in Column 13, Section C. Other Business, Line 2.

If stop-loss policies are sold on a Per Employee Per Month basis and the actual number of covered lives is unknown, it would be reasonable to estimate the number of covered lives if the exact information is not administratively available to the reporting entity. This method of estimation may be similar to estimations provided for the Accident and Health Policy Experience Exhibit for Year. If estimated, an explanation of the method used to estimate the number of covered lives should be provided in the footnote.

PR020 - Underwriting Risk – Premium Risk for Comprehensive Medical, Medicare Supplement and Dental and Vision

(Underwriting Risk – Experience Fluctuation Factor in the LRBC Formula)

The underwriting risk generates the RBC requirement for the risk of fluctuations in underwriting experience. The credit that is allowed for managed care in this worksheet comes from PR021 Underwriting Risk - Managed Care Credit.

The columns are as follows:

Column (1) – Comprehensive (Hospital & Medical) Individual Policies that provide fully insured indemnity, HMO, PPO, or Fee for Service coverage for hospital, medical, and surgical expenses. This category excludes Short-Term Medical Insurance, the Federal Employees Health Benefit Program and non-comprehensive coverage such as basic hospital only, medical only, hospital confinement indemnity, surgical, outpatient indemnity, specified disease, intensive care, and organ and tissue transplant coverage as well as any other coverage described in the other categories of this exhibit.

Column (2) – Comprehensive (Hospital & Medical) Group Policies that provide fully insured indemnity, HMO, PPO, or Fee for Service coverage for hospital, medical, and surgical expenses. This category excludes Short-Term Medical Insurance, the Federal Employees Health Benefit Program and non-comprehensive coverage such as basic hospital only, medical only, hospital confinement indemnity, surgical, outpatient indemnity, specified disease, intensive care, and organ and tissue transplant coverage as well as any other coverage described in the other categories of this exhibit.

Column (3) – Title XVIII Medicare Policies issued as Medicare Advantage Plans providing Medicare benefits to Medicare eligible beneficiaries created by title XVIII of the Social Security Act of 1965. This includes Medicare Managed Care Plans (i.e., HMO and PPO) and Medicare Private Fee-for-Service Plans. This also includes all Medicare Part D Prescription Drug Coverage through a Medicare Advantage product and whether sold directly to an individual or through a group.

Column (4) – Title XIX Medicaid Policies issued in association with the Federal/State entitlement program created by Title XIX of the Social Security Act of 1965 that pays for medical assistance for certain individuals and families with low incomes and resources.

Column (5) – Medicare Supplement. Policies that qualify as Medicare Supplement policy forms as defined in the NAIC Medicare Supplement Insurance Minimum Standards Model Act. This includes standardized plans, pre-standardized plans and Medicare select. Does not include Medicare (Title XVIII) or Medicaid (Title XIX) risk contracts.

Column (6) – Vision Only Policies providing for vision only coverage issued as stand-alone vision or as a rider to a medical policy that is not related to the medical policy through premiums, deductibles or out-of-pocket limits. Does not include self-insured business, federal employees health benefit plans (FEHBP), or Medicare and Medicaid programs.

Column (7) – Dental Only Policies providing for dental only coverage (dental treatment benefits such as routine dental examinations, preventive dental work, and dental procedures needed to treat tooth decay and diseases of the teeth and jaw) issued as stand-alone dental or as a rider to a medical policy that is not related to the medical policy through premiums, deductibles or out-of-pocket limits. If dental benefits are part of a comprehensive medical plan, then include data under comprehensive/major medical category. Does not include self-insured business, as well as federal employee's health benefits plans (FEHBP), or Medicare and Medicaid programs.

Column (8) – Stand-Alone Medicare Part D Coverage. This includes both individual coverage and group coverage of Medicare Part D coverage where the plan sponsor has risk corridor protection. See INT 05-05: Accounting for Revenue under Medicare Part D Coverage for definition of these terms. Medicare drug benefits included in major medical plans or benefits that do not meet the above criteria are not to be included in this line. Supplemental benefits within Medicare Part D (benefits in excess of the standard benefit design) are addressed separately on page PR019. Employer-based Part D coverage that is in an uninsured plan as defined in *SSAP No. 47—Uninsured Plans* is not to be included here

Description from *Life Risk-Based Capital Report Including Overview & Instructions*:

Underwriting risk is present when the next dollar of unexpected claims payments comes directly out of the company's capital and surplus. It represents the risk that the portion of premiums intended to cover medical expenses will be insufficient to pay such expense. For example, an insurer may charge an individual $100 in premium in exchange for a guaranty that all medical costs will be paid by the insurer. If the individual incurs $101 in claims costs, the company's surplus will decline because it did not charge a sufficient premium to pick up the additional risk for that individual.

There are other arrangements where the insurer is not at risk for excessive claims payments, such as when an insurer agrees to serve as a third-party administrator for a self-insured employer. The self-insured employer pays for actual claims costs, so the risk of excessive claims experience is borne by the self-insured employer, not the insurer. The underwriting risk section of the RBC formula, therefore, requires some adjustments to remove non-risk business (both premiums and claims) before the RBC requirement is calculated.

For Stand-Alone Medicare Part D Coverage, the reduction in uncertainty comes from two federal supports. The reinsurance coverage is optional in that a plan sponsor may elect to participate in the Part D Payment Demonstration. The risk corridor protection is expected to have less impact after the first few years. To allow flexibility within the RBC formula, Lines (10.1) through (10.4) of PR021 will be used to give credit for the programs in which the plan sponsor participates. While all PDPs will have formularies and may utilize other methods to reduce uncertainty, for the near future no other managed care credits are allowed for this coverage.

Claims Experience Fluctuation

The RBC requirement for claims experience fluctuation is based on the greater of the following calculations:

A. Underwriting risk revenue times the underwriting risk claims ratio times a set of factors.

or

B. An alternate risk charge that addresses the risk of catastrophic claims on any single individual. The alternate risk charge is $500,000 per line for medical coverage, $50,000 total for all other coverage except Medicare Part D coverage, and $150,000 total for Medicare Part D coverage. Additionally, for multi-line organizations (i.e., writing more than one coverage type), the total alternate risk charge is the highest of the cumulative alternate risk charges for each of the following: Comprehensive (Comprehensive – Individual, Comprehensive – Group, Title XVIII – Medicare, Title XIX – Medicaid); Medicare Supplement; Dental & Vision (Dental only, Vision Only); Medicare Part D; and Other Health. For example, if an organization writes Comprehensive – Individual, Comprehensive – Group, Vision Only, and Dental Only, the alternate risk charge is $1,000,000 (the cumulative charge for Comprehensive – Individual and Comprehensive – Group, which is higher than the $100,000 cumulative charge for Vision Only and Dental Only.)~~The alternate risk charge is calculated for each type of health coverage, but only the largest value is compared to the value from A. above for that type. The alternate risk charge is equal to a multiple of the maximum retained risk on any single individual in a claims year. The maximum retained risk (level of potential claim exposure) is capped at two times the maximum or $1,500,000 for Comprehensive Medical; two times the maximum or $50,000 for each of Medicare Supplement business and dental coverage and six times the maximum or $1,500,000 for Stand-Alone Medicare Part D coverage.~~

Line (1) through Line (19~~8~~)

There are ~~four~~ eight lines of business used in the property/casualty RBC formula for calculating the RBC requirement in this worksheet. Other health coverages will continue to use the factors on PR019 Health Premiums. The ~~four~~ eight lines of business are Column (1) Comprehensive Medical ~~and Hospital~~Individual; Column (2) Comprehensive Medical Group; Column (3) Title XVIII Medicare; Column (4) Title XIX Medicaid; Column (5~~2~~) Medicare Supplement; Column (6~~3~~) ~~Dental &~~ Vision; Column (7) Dental; and Column (8~~4~~) Stand-Alone Medicare Part D coverage. Each of the ~~four~~ eight lines of business has its own column in the Underwriting Risk – Premium Risk table. The categories listed in the columns of this worksheet include premiums plus all risk revenue that is received from another health entity in exchange for medical services provided to such Health entity's members. ~~The descriptions of the items are as follows:~~

~~Comprehensive Medical & Hospital~~

~~Includes policies providing for medical coverages including hospital, surgical, major medical, Medicare risk coverage (but NOT Medicare Supplement), and Medicaid risk coverage. This includes Medicare Advantage, with or without prescription drug benefits. This category DOES NOT include administrative services contracts (ASC) or administrative services only (ASO) contracts, or any non-underwritten business. These programs are reported in PR022 Underwriting Risk – Other, Business Risk section of the formula. Neither does it include Federal Employees Health Benefit Program (FEHBP) business, which is reported on Line (3) of PR022 Underwriting Risk – Other. The alternative risk charge, which is twice the maximum retained risk after reinsurance on any single individual, cannot exceed $1,500,000.~~

~~Medical Only (non-hospital professional services)~~

~~Include in Comprehensive Medical.~~

~~Medicare Supplement~~

~~This is business reported in the Medicare Supplement Insurance Experience Exhibit of the annual statement. Medicare risk business is reported under comprehensive medical and hospital.~~

~~Dental & Vision~~

~~These are premiums for policies providing for dental or vision only coverage issued as stand-alone dental or vision or as a rider to a medical policy that is not related to the medical policy through deductibles or out-of-pocket limits.~~

~~Stand-Alone Medicare Part D Coverage~~

~~Includes policies and contracts providing the standard coverage for individuals enrolled in Stand-Alone Medicare Part D and the insurance is a federally approved PDP with risk corridor protection. It does not include risk revenue for Supplemental benefits within Stand-Alone Medicare Part D coverage that is a portion of the PDP's approved package. It does not include employer coverage unless the coverage meets the above criteria. Where there is a federal subsidy to the employer in lieu of risk corridor protection, the premiums are to be reported as "Other Health."~~

~~Other Health Coverages~~

~~Include in the appropriate line on PR019 Health Premiums.~~

The following paragraphs explain the meaning of each line of the worksheet table for computing the experience fluctuation underwriting risk RBC.

Line (1) Premium
This is the amount of money charged by the insurer for the specified benefit plan. It is the earned premium, net of reinsurance. It does not include receipts under administrative services only (ASO) contracts; or administrative services contracts (ASC); or any non-risk business; or premium for the Federal Employees Health Benefit Programs (FEHBP), which has a risk factor relating to incurred claims reported separately under PR022 Underwriting Risk – Other, Line (3).

NOTE: Where premiums are paid on a monthly basis, they are generally fully earned at the end of the month for which coverage is provided. In cases where the mode of payment is less frequent than monthly, a portion of the premium payment will be unearned at the end of any given reporting period.

For Stand-Alone Medicare Part D Coverage, this will include only certain amounts paid by the individual, an employer or CMS. See Appendix 2 for details of what is and is not premium income.

The Line 1.3 sources for each column are given in the table below:

PR020 Column	**Annual Statement Source**
Comprehensive Medical Individual	U&I Part 1, Column 4 Line 13.1
Comprehensive Medical Group	U&I Part 1, Column 4 Line 13.2
Title XVIII Medicare	U&I Part 1, Column 4 Line 15.6
Title XIX Medicaid	U&I Part 1, Column 4 Line 15.5
Medicare Supplement	U&I Part 1, Column 4 Line 15.4
Vision	U&I Part 1, Column 4 Line 15.1
Dental	U&I Part 1, Column 4 Line 15.2
Stand-Alone Medicare Part D Coverage	Company Records, Earned Premium Net of Reinsurance

~~Line (2) Title XVIII Medicare~~
~~This is the earned amount of money charged by the insurer (net of reinsurance) for Medicare risk business where the insurer, for a fee, agrees to cover the full medical costs of Medicare subscribers. This includes the premium and federal government's direct subsidy for prescription drug coverage under MA-PD plans.~~

~~Line (3) Title XIX Medicaid~~
~~This is the earned amount of money charged by the insurer for Medicaid risk business where the insurer, for a fee, agrees to cover the full medical costs of Medicaid subscribers. Revenue from Stand-Alone Medicare Part D coverage under the low-income subsidy (cost sharing portion) and low-income subsidy (premium portion) are not included in this line.~~

Line (24) Other Health Risk Revenue
Earned amounts charged by the reporting company as a provider or intermediary for specified medical (e.g., full professional, dental, radiology, etc.) services provided to the policyholders or members of another insurer or health insurance company (Health). Unlike premiums, which are collected from an employer group or individual member, risk revenue is the prepaid (usually on a capitated basis) payments, made by another insurer or health insurance company to the company in exchange for services to be provided or offered by such organization. Payments to providers under risk revenue arrangements are included in the RBC calculation as underwriting risk revenue and are included in the calculation of managed care credits. Exclude fee-for-service revenue received by the company from a health entity. This revenue is reported in the business risk section of the formula as health ASO/ASC and limited risk revenue.

Line (3) Medicaid Pass-Through Payments Reported as Premiums.
Amount is equal to the total amount reported in PR019 Lines 7.3 and Line 18.3

Line (45) Underwriting Risk Revenue
~~The sum of~~ Lines ~~(~~1.3~~)~~ ~~+~~ Lines (2) – Line (3)~~through (4)~~.

Line (56) Net Incurred Claims
Claims incurred (paid claims + change in unpaid claims) during the reporting year (net of reinsurance) that are arranged for or provided by the insurer. Paid claims include capitation and all other payments to providers for services to covered lives, as well as reimbursement directly to insureds (or their providers) for covered services. Paid claims also include salaries paid to company employees that provide medical services to covered lives and related expenses. This line does not include ASC payments or Federal Employees Health Benefit Program (FEHBP) claims.

PR020 Column	**Annual Statement Source**
Comprehensive Medical Individual	U&I Part 2, Column 7 Line 13.1
Comprehensive Medical Group	U&I Part 2, Column 7 Line 13.2
Title XVIII Medicare	U&I Part 2, Column 7 Line 15.6
Title XIX Medicaid	U&I Part 2, Column 7 Line 15.5
Medicare Supplement	U&I Part 2, Column 7 Line 15.4
Vision	U&I Part 2, Column 7 Line 15.1
Dental	U&I Part 2, Column 7 Line 15.2
Stand-Alone Medicare Part D Coverage	Company Records

~~Column (1) claims come from Annual Statement, Schedule H, Part 5 Column 1+2+7+8 Line D1 less the amounts reported as incurred claims for Administrative Services Contracts (ASC) in Line (8) of PR013 and Federal Employee Health Benefit Plan (FEHBP) in Line (3) of PR022. Column (2) claims come from Schedule H, Part 5, Column 3, Line D1. Column (3) dental and vision claims come from Schedule H, Part 5, Columns 4+5, Line D11.)~~

For Stand-Alone Medicare Part D Coverage, net incurred claims should reflect claims net of reinsurance coverage (as defined in Appendix 2). Where there has been prepayment under the reinsurance coverage, paid claims should be offset from the cumulative deposits. Unpaid claim liabilities should reflect expected recoveries from the reinsurance coverage – for claims unpaid by the PDP or for amounts covered under the reinsurance coverage that exceed the cumulative deposits. Where there has not been any prepayment under the reinsurance coverage, unpaid claim liabilities should reflect expected amounts still due from CMS.

Line (6) Medicaid Pass-Through Payments Reported as Claims.
Medicaid pass-through payments that were included as claims reported in Line (5)

Line (7) Fee-for-Service Offset
Report fee-for-service revenue that is directly related to medical expense payments. The fee-for-service line does not include revenue where there is no associated claim payment (e.g., fees or charges to nonmember/insured of the company where the provider of the service receives no additional compensation from the company) and when such revenue was excluded from the pricing of medical benefits.

Line (8) Underwriting Risk Incurred Claims
Line (56) – Line (6) ~~–minus~~ Line (7).

Line (9) Underwriting Risk Claims Ratio
Line (8) / Line (45). If either Line (45) or Line (8) is zero or negative, Line (9) is zero.

Line (10) Underwriting Risk Factor for Initial Amounts of Premium. Factor applied to the first $25,000,000 in premium for columns (1), (2), (3), (4), and (8) and applied to the first $3,000,000 in premium for columns (5), (6), (7),

Line (11) Underwriting Risk Factor for Excess of Initial Amount. Factor applied to premium in excess of $25,000,000 in premium for columns (1), (2), (3), (4), and (8) and applied to premium in excess of $3,000,000 in premium for columns (5), (6), (7),

Line (12) Investment Income Adjustment Factor
The investment income yield was incorporated into the Comprehensive (Hospital & Medical) individual & group, Medicare Supplement and Dental & Vision lines of business. The purpose was to incorporate an offset to reduce the underwriting risk factor for investment income earned by the insurer. The Working Group incorporated a 4.5% income yield that was based on the yield of a 6-month U.S. Treasury bond. Each year, the Working Group will identify the yield of the 6-month U.S. Treasury bond (U.S. Department of the Treasury) on each Monday through the month of January and determine if further modification to the 4.5% adjustment is needed. Any adjustments will be rounded up to the nearest 0.5%.

~~Line (10) Underwriting Risk Factor~~
~~A weighted average factor based on the amount reported in Line (5), Underwriting Risk Revenue.~~

	~~$0 - $3 Million~~	~~$3 - $25 Million~~	~~Over $25 Million~~
~~Comprehensive Medical~~	~~0.1427~~0.1440	~~0.1427~~0.1440	~~0.0832~~0.0844
~~Medicare Supplement~~	~~0.0973~~0.0987	~~0.0596~~0.0609	~~0.0596~~0.0609
~~Dental & Vision~~	~~0.1143~~0.1153	~~0.0706~~0.0716	~~0.0706~~0.0716
~~Stand-Alone Medicare Part D Coverage~~	~~0.251~~	~~0.251~~	~~0.151~~

Line (13) Composite Underwriting Risk Factor
A weighted average factor based on the amount reported in Line (4), Underwriting Risk Revenue. Includes the Investment Income Adjustment Factor

Line (14~~1~~) Base Underwriting Risk RBC
Line (4~~5~~) x Line (9) x Line (13~~0.3~~).

Line (15~~2~~) Managed Care Discount
For Comprehensive Medical & Hospital Individual, Comprehensive Medical & Hospital Group, Title XVIII Medicare, Title XIX Medicaid, Medicare Supplement (including Medicare Select), Vision, and Dental, a managed care discount, based on the type of managed care arrangements an organization has with its providers, is included to reflect the reduction in the uncertainty about future claims payments attributable to the managed care arrangements. The discount factor is from Column (3), Line (12) of PR021 Underwriting Risk - Managed Care Credit. An average factor based on the combined results of these ~~three~~ categories ~~is used for all three~~.

For Stand-Alone Medicare Part D Coverage, a separate managed care discount (or federal program credit) is included to reflect only the reduction in uncertainty about future claims payments attributable to federal risk arrangements. The discount factor is from Column (4), Line (12) of PR021 Underwriting Risk - Managed Care Credit.

Line (16~~3~~) Base RBC After Managed Care Discount
Line (14~~1~~) x Line (15~~2~~).

~~Line (14) RBC Adjustment for Individual~~
~~The average Experience Fluctuation Risk charge is increased by 20% for the portion relating to Individual Medical Expense premiums in Column (1). Other types of health coverage do not differentiate between Individual and Group. The additional time necessary to develop sufficient data to make a premium filing with states and then to implement the premium increase was modeled to calculate this factor.~~

~~Line (15) Maximum Per-Individual Risk After Reinsurance~~

~~This is the maximum loss after reinsurance for any single individual. Where specific stop-loss reinsurance protection is in place, the maximum per individual risk after reinsurance is equal to the highest attachment point on such stop-loss reinsurance, subject to the following:~~

- ~~Where coverage under non-proportional reinsurance or stop-loss protection with the highest attachment point is capped at less than $750,000 per insured for Comprehensive Medical and $25,000 for the other three lines, the maximum retained loss will be equal to such attachment point plus the difference between the coverage maximum per claim and $750,000 or $25,000, whichever is applicable.~~

- ~~Where the non-proportional reinsurance or stop-loss protection is subject to participation by the company, the maximum retained risk as calculated above will be increased by the company's participation in claims in excess of the attachment point, but not to exceed $750,000 for Comprehensive Medical and $25,000 for the other three coverages.~~

~~If there is no specific stop-loss or reinsurance in place, enter the largest amount payable (within a calendar year) or $9,999,999 if there is no limit.~~

~~Examples of the calculation are presented below:~~

~~EXAMPLE 1 (Insurer provides Comprehensive Care):~~

~~Highest Attachment Point (Retention)~~	~~$100,000~~
~~Reinsurance Coverage~~	~~90% of $500,000 in excess of $100,000~~
~~Maximum Reinsured Coverage~~	~~$600,000 ($100,000 + $500,000)~~

~~Maximum Retained Risk =~~	~~$100,000~~	~~deductible~~
	~~+$150,000~~	~~($750,000 – $600,000)~~
	~~+$50,000~~	~~(10% of $500,000 coverage layer)~~
	~~=$300,000~~	

~~EXAMPLE 2 (Insurer provides Comprehensive Care):~~

~~Highest Attachment Point (Retention)~~	~~$75,000~~
~~Reinsurance Coverage~~	~~90% of $1,000,000 in excess of $75,000~~
~~Maximum Reinsured Coverage~~	~~$1,075,000 ($75,000 + $1,000,000)~~

~~Maximum Retained Risk =~~	~~$75,000~~	~~deductible~~
	~~+$0~~	~~($750,000 – $1,075,000)~~
	~~+$67,500~~	~~(10% of $675,000 coverage layer)~~
	~~=$142,500~~	

Line (17~~6~~) Alternate Risk Charge

$500,000 for Columns (1), (2), (3), and (4); $50,000 for Columns (5), (6), and (7); and $150,000 for Column (8).~~Twice the amount in Line (15), subject to a maximum of $1,500,000 for comprehensive medical and $50,000 for Medicare Supplement and Dental. Six times the amount in Line (15), subject to maximum of $150,000 for Stand-Alone Medicare Part D Coverage.~~

Line (18~~7~~) Net Alternate Risk Charge

~~The largest value from Line (16) is retained for that column in line (17) and all others are ignored.~~ The alternate risk charge is $500,000 per line for medical coverage, $50,000 total for all other coverage except Medicare Part D coverage, and $150,000 total for Medicare Part D coverage. Additionally, for multi-line organizations (i.e., writing more than one coverage

type), the total alternate risk charge is the highest of the cumulative alternate risk charges for each of the following: Comprehensive (Comprehensive – Individual, Comprehensive – Group, Title XVIII – Medicare, Title XIX – Medicaid); Medicare Supplement; Dental & Vision (Dental only, Vision Only); Medicare Part D; and Other Health.

Line (19~~8~~) Net Underwriting Risk RBC
The maximum of Line (164) and Line (18~~7~~).

Report to the National Association of Insurance Commissioners Property and Casualty Risk-Based Capital (E) Working Group

Property and Casualty Risk-Based Capital Premium and Loss Concentration Factors

Presented by the American Academy of Actuaries[1]
Property and Casualty Risk-Based Capital Committee

November 7, 2025

[1] The American Academy of Actuaries is a 20,000-member professional association whose mission is to serve the public and the U.S. actuarial profession. For 60 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.

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The analysis and conclusions in this Report reflect the opinions of the committee members and do not necessarily reflect the views of their employers or the actuarial organizations in which they are members.

CONTENTS

1. BACKGROUND

The American Academy of Actuaries Property and Casualty Risk-Based Capital Committee ("Committee" or "We") prepared this Report ("Report") at the request of the National Association of Insurance Commissioners' ("NAIC") Property and Casualty (P&C) Risk-Based Capital (RBC) Working Group ("NAIC Working Group" or "Working Group").

In this Report, we evaluate the indicated Loss Concentration Factor ("LCF") and Premium Concentration Factor ("PCF")—RBC Line 14 on pages PR017 and PR018, respectively.[2]

The LCF/PCFs have not been revised since the inception of the RBC Formula.

This is Report 3 in the series of reports described to the NAIC Working Group in May 2019:

- Report 1: Indicated risk factors (Line 4 in the RBC Formula pages PR017 and PR018). We refer to these as Line 4 Factors. This report was submitted to the Working Group in March 2021 and revised in April 2021 ("April 2021 Report"[3]).
- Report 2: Indicated Investment Income Adjustment (IIA) factors (Lines 7/8 in the RBC Formula) and updated indicated Line 4 Factors. This report was submitted to the Working Group in August 2023 ("August 2023 Report"[4]).
- Report 3: This Report on indicated LCFs and PCFs.

The analysis presented in this Report uses the same insurance industry data as Reports 1 and 2, i.e., data evaluated through December 31, 2017.[5]

[2] "PR017" and "PR018" refer to pages in the 2022 NAIC P&C RBC Formula forms, which insurers file annually on a confidential basis.

[3] American Academy of Actuaries Property and Casualty Risk-Based Capital Committee, "Report to the National Association of Insurance Commissioners Property and Casualty Risk-Based Capital (E) Working Group Update to Property and Casualty Risk-Based Capital Underwriting Factors Experience Through December 31, 2017," Presented March 2021 (Revised April 21, 2021).

[4] American Academy of Actuaries Property and Casualty Risk-Based Capital Committee, "Update to Property and Casualty Risk-Based Capital Underwriting Factors and Investment Income Adjustment Factors," Presented Aug. 31, 2023.

[5] Substantial work is involved in data preparation for the three analyses in the May 2019 letter to the NAIC. Therefore, we planned to produce the three reports with the same data. While the Reports have taken longer than we anticipated, adding additional data was not clearly beneficial as (a) processing additional data would have delayed this report, (b) the data includes 30 AYs, 1988-2017, so the effect of adding a small number of years, unless they identify new trends, is not likely to be material, and (c) any new trends from additional data through 2022, for example, would include the initial COVID effects on claim frequency and severity, but not the full cycle of COVID emergence in favorable and unfavorable impacts on loss ratio and reserve development. Furthermore, both this study and CAS Dependency and Calibration Working Party (DCWP) Report #14, which used data through 2010, support an increase in the MDC.

LCF/PCF in RBC Formula

RBC Terminology

Unless otherwise specified, references to the RBC Formula relate to the formula used for the year-end 2022 RBC Formula. "Indicated risk factors" are the indicated Line 4 premium and reserve risk factors presented in the Academy's August 2023 Report 2.[6]

The Authorized Control Level (ACL) capital is 50% of the Company Action Level (CAL) capital value calculated using the RBC Formula.[7] The factors we discuss herein are used to produce the CAL required capital value.

LCF/PCF

The LCF and PCF components of the RBC Formula reduce the Total Reserve RBC value on PR017 and the Net Written Premium RBC value on PR018 for multiline companies. For each company, the concentration is measured as the largest of the 19 RBC lines of business (LOBs) premiums or reserves, divided by the total premium or reserve.

- This ratio is 100% for monoline companies.
- The ratio is lower, though greater than zero, for diversified companies.

We refer to this method of measuring concentration as the Company Maximum Line Percentage of Business or "CoMaxLine%" approach, denoted as $\text{CoMaxLine\%}_{\text{premium}}$ and $\text{CoMaxLine\%}_{\text{reserve}}$, for premium and reserve risk, respectively.

The CoMaxLine% approach includes a parameter we call the Maximum Diversification Credit (MDC). The MDC is the notional maximum diversification credit for a company with a not achievable zero concentration ratio.[8]

[6] The NAIC decided that, except for a small number of LOBs lines affected by specific issues, the Line 4 Factors indicated in the August 2023 Report will be implemented partly in the 2024 RBC Formula and fully in the 2025 RBC Formula.

[7] If the company's Total Adjusted Capital is below the Company Action Level (CAL) value from the RBC Formula, then, according to the RBC Instructions, subject to state laws and regulations, "…the company [is required] to prepare and submit an RBC Plan to the commissioner of their state of domicile. The RBC Plan is to be submitted within 45 days. After review, the commissioner will notify the company if the plan is satisfactory." The value produced by the RBC Formula on PR032, Line 71, is the CAL value.

The Authorized Control Level (ACL) capital is 50% of the CAL value. "Authorized Control Level authorizes the commissioner to take whatever regulatory actions are considered necessary to protect the best interest of the policyholders and creditors of the insurer, which may include the actions necessary to cause the insurer to be placed under regulatory control (i.e., rehabilitation or liquidation)."

[8] 0% concentration is not achievable because the number of LOBs is finite, but premium or reserves equally spread among 19 LOBs would produce a concentration value of 1/19 or approximately 5%. With CoMaxLine% equal to 5%, the concentration factor would be 0.715 and the diversification credit would be 28.5%.

In the current RBC Formula, the MDC is 30%. The MDC is applied linearly based on CoMaxLine%[9] for each company as follows:

- $PCF_{COMPANY} = (1 - MDC) + (MDC * CoMaxLine\%_{premium})$, or
- $PCF_{COMPANY} = 0.7 + 0.3 * CoMaxLine\%_{premium}$

- $LCF_{COMPANY} = (1 - MDC) + (MDC * CoMaxLine\%_{reserves})$, or
- $LCF_{COMPANY} = 0.7 + 0.3 * CoMaxLine\%_{reserves}$

Thus, the diversification credit is 1.0 - PCF or 1.0 - LCF, for premium and reserves, respectively. A monoline company receives no diversification credit as the PCF and LCF equal 1.0.

The Total Net Reserve RBC (PR017) and the Net Written Premium RBC (PR018) are each calculated by summing the RBC amounts across all LOBs and multiplying by the LCF or PCF, on PR017 and PR018 Lines 13 and 14, respectively.

Origin of CoMaxLine% and 30% MDC

The CoMaxLine% approach was originally selected during the mid-1990s when the RBC Formula was developed. The CoMaxLine% formula with the 30% MDC was presented in a February 1993 Actuarial Advisory Committee report to the NAIC P/C Risk-Based Capital Working Group.[10,11]

It was adopted as part of the original RBC Formula and has not been revised since.

[9] For example, a company with 25% of its premium in its largest line would have PCF = 0.7 + 0.3 * 0.25 = 77.5% under the CoMaxLine% approach. It would receive a diversification credit equal to 1.0 – PCF = (1.0 – $CoMaxLine\%_{premium}$) * MDC = 75% of 30% = 22.5%. The credit is applied to the sum of the risk charges by LOB. In other words, the risk charges would be summed across all LOBs and then that sum would be multiplied by 0.775 (77.5% = 100% - 22.5%). A monoline company has a zero diversification credit and CoMaxLine% = 100%.

[10] "Report on Covariance Method for Property-Casualty Risk-Based Capital," pages 173-202.

We have not identified references to NAIC discussion of the 30% MDC in the Actuarial Advisory Committee report.

[11] Our calibration approach and the 1993 calibration approach are different. For example, our MDC calibration approach is based on 87.5th percentile outcomes (consistent with the Line 4 calibration). This differs from the 1993 MDC calibration approach which was based on standard deviations and correlations.

2. IMPACT OF REVISED LCF/PCF

Based on the Committee's work, described in detail in this report, the Committee believes:

- MDCs of 45% for premium and 65% for reserves are reasonable selections and are better supported by the data than the current 30% MDC.

  We refer to these as the indicated MDCs.

- There are alternative reasonable MDC selections that the NAIC might select, and we discuss some of them, below, in Section 3/ Alternative Indicated MDCs.

- With the indicated MDCs, the PCF and LCF formulas would be

  - $PCF_{COMPANY} = 0.55 + 0.45 * CoMaxLine\%_{premium}$
  - $LCF_{COMPANY} = 0.35 + 0.65 * CoMaxLine\%_{reserves}$

- While the CoMaxLine% approach is not perfect, considering the alternatives, the Committee believes it is a reasonable approximation, especially for more diversified companies.

Tables 2-1 through 2-5, below, show the effect on ACL reserve risk charges and premium risk charges of adopting MDCs of 45% for premium and 65% for reserves.

Table 2-1: Average RBC Value Change

Table 2-1 shows the change in RBC values assuming MDCs of 45% and 65%, in total and by Type of Company,[12] based on NAIC staff analysis using 2025 Line 4 risk factors and Line 7/8 IIA Factors.

[12] As described in the April 2021 Report 1 and August 2023 Report 2, each LOB is categorized by the NAIC P&C Working Group as typical of a particular Type of Company, e.g., B-PPA is typical of Personal Lines companies. For each company, the category with the largest amount of net written premium (NWP) + reserves determines the Type for that company. For example, a company with more of its premium in B-PPA, Homeowners A-HO and J-APD than in any of the other groups of LOBs is categorized as Personal Lines as opposed to Commercial Lines. Report 2, Appendix 8, pages 114-115, provides more details.

Table 2-1
Indicated Changes in RBC Values by Type of Company[13]

(1)	(2)	(3)	(4)	(5)	(6)
Row	Type of Company	ACL - $ Billions (2022)	% Change		
			Reserve Risk Charge	Premium Risk Charge	ACL
1	Commercial	84.4	-21.6%	-11.7%	-13.4%
2	Med Prof Liab	2.9	-8.0%	-3.4%	-1.9%
3	NOC	0.7	-6.5%	-3.1%	-2.2%
4	Personal	100.2	-18.2%	-9.2%	-2.1%
5	Reinsurance	9.5	-22.3%	-11.4%	-2.4%
6	Workers Comp	7.5	-10.0%	-4.5%	-5.7%
7	Total	205.3	-20.0%	-10.0%	-6.9%

From individual company RBC Filing data, summarized by NAIC staff and provided, in summary form, to this Committee.
Uses 2022 RBC Formula, but using 2025 Line 4 Factors and Line 7/8 IIA Factors. Compares ACL with 30% MDC to ACL with indicated MDCs.
Including only companies with RBC Filings in 2022 and 2022 non-zero net written premium plus loss reserves (NWP+Rsv>0).
NOC = "Not otherwise classified" Type of Company.[14]

Table 2-1 shows that the weighted average impacts are:

- Reserve risk is decreased by 20%.
- Premium risk is decreased by 10%.
- ACL is decreased by 6.9%.

The Table also shows:

- Reserve risk and premium risk reductions are largest for Commercial, Personal, and Reinsurance Types of Companies.
- However, the ACL reduction for Reinsurance and Personal companies is much smaller than for Commercial companies.

  This is because Reinsurance and Personal Types of Company have a greater share of RBC from risk categories other than reserve risk and premium risk, and the RBC values from those risks are not affected[15] by the change in diversification.

[13] Including only companies with 2022 RBC Filings and non-zero net written premium plus loss reserves.

[14] "NOC," standing for Not Otherwise Classified, means companies for which the portion of net written premium plus loss reserves is greatest for the sum of the following LOBs: G-SL, K-Fid/Sur, L-Other, M-Intl, or S-FG/MG. See glossary for LOB abbreviations definition.

[15] Although, in some cases, the R3-credit risk is affected by the relative values of reserve risk and reinsurance credit risk.

Table 2-2: Distribution of % Change in RBC Value

Table 2-2 shows the number of companies with various percentage changes in ACL value, comparing the ACL value using the current MDC to the ACL value using the indicated MDC.

Table 2-2
Distribution of Number of Companies by Change in ACL Values

(1)	(2)	(3)
% Changes in ACL	# Companies	% Companies
Less than -50%	0	0%
-35% to -50%	0	0%
-25% to -35%	46	3%
-15% to -25%	202	11%
-5% to -15%	500	28%
0% to -5%	676	37%
0%	393	22%
Greater than 0%	0	0%
Total	1,817	100%

Excluding companies with zero NWP+Rsv.

This table shows:

- No company sees an increase in ACL.
- 59% of companies see ACL decreases between 0% and 5%.
- 3% of companies see a decrease in ACL greater than 25%.

The individual company data shows that the largest decrease in ACL value is 29%.

Tables 2-3 through 2-5: ACL Changes by Size and Diversification

These tables show changes in:

- Reserve Risk (Table 2-3)
- Premium Risk (Table 2-4)
- ACL (Table 2-5)

We show five size bands, A-E, each with 20% of the companies. Underwriting (UW) Size in these Tables equals the sum of net written premium and net reserves.

We show six levels of diversification.[16]

- Level "0" refers to monoline companies.

[16] In Table 2-3 through 2-5, diversification by company is the weighted average of the premium diversification and the reserve diversification, calculated as the square root of the sum of (a) the square of premium diversification credit in dollars, plus (b) the square of the reserve diversification credit in dollars.

- Levels 1-5 refer to five levels of diversification, each with 20% of the non-monoline companies.

Table 2-3 – Reserves
% Change in Reserve Risk Value by UW Size and Diversification

Div/Size	A	B	C	D	E	All
0	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
1	-0.9%	-1.4%	-1.6%	-2.1%	-2.2%	-2.1%
2	-5.8%	-6.0%	-8.4%	-6.5%	-8.4%	-8.2%
3	-10.7%	-12.9%	-10.4%	-14.4%	-12.2%	-12.3%
4	-17.1%	-22.9%	-19.1%	-18.9%	-19.5%	-19.5%
5	-17.9%	-26.4%	-25.4%	-26.4%	-29.3%	-29.2%
All	-3.2%	-8.0%	-11.7%	-13.8%	-20.6%	-20.0%

Table 2-4 – Premium
% Change in Premium Risk Value by UW Size and Diversification

Div/Size	A	B	C	D	E	All
0	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
1	-0.1%	-0.7%	-0.9%	-1.2%	-1.2%	-1.1%
2	-3.0%	-3.3%	-4.1%	-3.4%	-4.0%	-3.9%
3	-6.5%	-5.9%	-6.9%	-7.1%	-8.1%	-8.0%
4	-8.9%	-8.3%	-9.0%	-9.7%	-11.0%	-10.9%
5	-11.1%	-12.2%	-13.2%	-13.2%	-13.9%	-13.8%
All	-1.4%	-3.2%	-6.1%	-7.3%	-10.4%	-10.0%

Table 2-5 – Total ACL
% Change in Unweighted ACL Value by UW Size and Diversification

Div/Size	A	B	C	D	E	All
0	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
1	-0.5%	-0.6%	-0.9%	-1.0%	-0.7%	-0.7%
2	-1.8%	-3.3%	-3.3%	-3.7%	-3.9%	-3.2%
3	-4.6%	-6.0%	-6.6%	-8.7%	-8.3%	-7.1%
4	-6.7%	-7.4%	-10.7%	-10.7%	-12.5%	-10.5%
5	-7.4%	-14.9%	-16.2%	-17.7%	-16.6%	-16.6%
All	-3.5%	-5.4%	-6.3%	-7.0%	-7.0%	-6.4%

Table 2-5 shows the unweighted average effect on ACL, as several very large companies have unusual values for RBC risks other than reserve risk and premium risk. As a result, the weighted averages distort patterns by size and diversification that apply to most companies.

Therefore, "All" in Table 2-5, 6.4%, differs from the average in Table 2-1, 6.9%, which is weighted by ACL value.

Tables 2-3 and 2-4 show average effect weighted by premium/reserves, within each cell, so "All" in Tables 2-3 and 2-4 agree with the average in Table 2-1.

These tables show the following:

- The effect of the change in MDC is zero for monoline companies (diversification band 0) and largest for companies with diversification level 5.
- The impact of the change in MDC is greater for reserve risk than for premium risk.
- In total, the row "All," larger companies tend to be more diversified, hence see greater ACL reductions.

Based on past practices, we note that the NAIC might provide additional analysis of MDC impact after evaluating this report; for example, the extent to which there are changes in the number of companies below the various RBC action levels or the distribution of companies with capital at specific multiples of CAL.

3. SUMMARY – APPROACH, KEY FINDINGS, AND SENSITIVITY TESTS

The CoMaxLine% approach assumes:

- The MDC, which determines the total diversification credit arising from the RBC Formula, is 30%, and
- Diversification credit by company is proportional to 1.0-CoMaxLine%.

In this Section, we summarize our analysis of these CoMaxLine% assumptions. For this summary and in the remainder of this report, we assume the reader has some knowledge of the methods used in Reports 1 and 2.

Approach & Findings

Data (Section 4)

Separately for premium and reserves:

1. We compile all-lines loss ratios (LRs) and reserve runoff ratios (RRRs) for each individual company (or each pool, for companies reporting on a pooled basis, for simplicity, referred to below as a "company," "company/year," or "data point") for each year 1988 to 2017.

   There are approximately 50,000 company/years of data across all years, for each of the premium and reserve data sets.

2. We assign each company to one of five size bands, referred to as A-E, with an equal number of companies in each size band.

   We also assign each company to one of six diversification bands, one monoline and 5 multi-line bands, referred to as 0-5, with an equal number of multi-line companies in each size band.

   Thus, there are 5x6=30 size/diversification cells.

Indicated Diversification Credit (Section 5-Part 1)

3. For each of the 30 size/diversification cells, we calculate the 87.5th percentile Accident Year Underwriting Loss % (AYUL%) and Reserve Runoff Ratios (RRRs) for companies in that cell. We refer to this as the **Observed Risk**.
4. For each of the 30 size/diversification cells, we also calculate the company average (each company counts once, regardless of size[17]) of premium and reserve RBC values (PR0018 and PR0017) before and after diversification, for companies in that cell.[18] We refer to this as the **Modeled Risk**, before or after diversification.

[17] This is consistent with the calibration of Line 4 Factors.

[18] The premium and reserve values in the Modeled Risk are based on the RBC formula with some simplifications: We do not include the IIA, the own-company adjustment, the loss-sensitive contract adjustment, or the growth risk charge. For premium risk, we used a simplified expense calculation. Section 7 describes these simplifications further.

5. The percentage difference between the Observed Risk and the Modeled Risk before diversification[19] is the indicated diversification credit for that cell.
6. For each cell, we calculate the MDC that would produce the indicated diversification credit for that cell, using the CoMaxLine% approach.

   By converting the indicated diversification credit by cell to an indicated MDC, we can compare the indicated MDC across diversification bands.

Overall Indicated MDC (Section 5-Part 1)

7. We calculate the weighted[20] average indicated MDC for the 9 cells: size bands C-E and diversification bands 3-5 that we refer to as cells C3-E5, or just C3-E5. These represent:
   a. 34% of premium company/years and 31% of reserve company/years,
   b. 84% of premium and 74% of reserves.
   c. 96% of the total premium diversification credit and 97% of the reserve diversification credit.[21]

   The resulting indicated MDCs are 45% for premium and 65% for reserves.

Finding 1:
Based on the above analysis, the committee believes that MDCs of 45% for premium and 65% for reserves are reasonable selections and are better supported by the data than the current 30% MDC. We refer to these as the indicated MDCs.

There are reasonable alternative MDC selections, some of which we discuss in the Alternative Indicated MDCs subsection below.

RBC Diversification Credit by Company (Section 5-Part 2 and Appendix 3)

8. We use regression through the origin to test the hypothesis that there is a linear relationship between CoMaxLine% and indicated diversification credit by level of diversification.
9. We reviewed the two 2019 Casualty Actuarial Society (CAS) Dependency and Calibration Working Party (DCWP) reports on alternative diversification formulas.[22]
   a. DCWP considered alternatives to CoMaxLine%, including:
      i. The Correlation Factor approach,

[19] Since the Observed Risk and the Modeled Risk are calibrated to the 87.5th percentile, runoff, safety level, we interpret the result as the 87.5th percentile, runoff, MDC.

[20] Weights are equal to the number of data points in each cell.

[21] Diversification credit measured as a percentage of Modeled Risk that does not reflect IIA, the own-company adjustment or the loss-sensitive contract adjustment.

[22] Report 13 - RBC LOB Diversification: Current RBC Approach vs. Correlation Matrix Approach, CAS E-Forum Winter 2019.

Report 14 - Calibration of LOB Diversification in Underwriting Risk Charges, CAS E-Forum Spring 2019

DCWP work was based on data through December 2010.

ii. The CoMaxLine% approach using LOB risk, rather than LOB premium/serves ("volume"),[23] and

iii. The Herfindahl-Hirschman Index (HHI),[24] rather than CoMaxLine%.

b. DCWP found that alternatives to CoMaxLine%:

i. Do not produce very different results, by company,

ii. Do not indicate greater accuracy, and

iii. Are not theoretically more appropriate in the context of the RBC Formula.[25]

10. The indicated MDCs using the approach outlined above are largely independent[26] of the method of measuring diversification by company.

Therefore, to that extent, the choice of diversification formulas largely affects only the allocation by company and has only a limited effect on the total diversification credit across all companies.

Finding 2:
While the linear relationship between diversification credit and CoMaxLine% is not exact, considering the alternatives, the Committee believes it is a reasonable approximation, especially for more diversified companies.

[23] CoMaxLine%-Risk approach applies the CoMaxLine% framework to LOB risk rather than LOB volume, when calculating the LCF and PCF for a company. For clarity, as needed, we refer to the current implementation as CoMaxLine%-Volume and the alternative as CoMaxLine%-Risk.

For this purpose, LOB reserve risk equals reserve value times reserve risk factor. LOB premium risk equals premium value times premium risk factor plus expenses minus 100%. The PCF and LCF are calculated using LOB-risk rather than LOB-volume. For premium risk, implementation of this method requires expense information by LOB.

[24] HHI equals the sum of the squares of the LOB shares of total. For example, if there is only one LOB, HHI is 1.0, as is the case for the CoMaxLine%. 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. With two lines split 50% and 50% HHI and the CoMaxLine% are both 0.5.

[25] Except that CoMaxLine%-risk may be more appropriate than CoMaxLine%-volume.

[26] The indicated diversification credit from Approach Step 6 depends on the diversification allocation method only to the extent that different methods would assign companies to different diversification bands.

The indicated MDC from Step 7 depends on the extent to which diversification credit varies linearly with the CoMaxLine% diversification metric for the larger/more diversified companies, C3-E5.

DCWP analysis indicates the different methods tend to assign companies to the same bands and produce relatively similar diversification credits, especially for the more diversified companies.

Therefore, we can view the total diversification credit implied by Step 7 as being largely independent of the diversification metric, CoMaxLine%, or otherwise.

Finding 3:
We recommend further research on alternatives to the current RBC diversification approach, particularly the method we refer to as CoMaxLine%-Risk, which measures diversification by risk by LOB rather than dollars of premium/reserve.

Alternative Indicated MDCs

Table 3-1 identifies several other MDC selections that the NAIC could reasonably adopt, based on alternative assumptions.

Table 3-1
Alternative Indicated MDCs

Item	Alternative Method	Indicated MDC	
		Premium	Reserve
1	Base indicated MDC	46%	66%
2	Use Size Adjusted Line 4 Factors	42%	56%
3	Using combined RBC and Annual Statement data to calibrate indicated MDCs	**56%**	59%
4	Using 6-cell averge D3.E5 (Largest)	**50%**	**80%**
5	Using 6-cell average C4.E5 (Most diversified)	**48%**	55%
6	Using 4-cell average D4.E5	**50%**	64%
7	Regression analysis	45%	58%
8	Early years only (1988-2002)	42%	58%
9	Recent years only (2003-2017)	**64%**	**85%**
Yellow= MDC lower than row 1			
Green = MDC higher than row 1			

We discuss these alternatives below and provide further details in Section 6: Sensitivity Analysis. We note that any of these alternatives implies an MDC higher than the current 30%.

Row 1: Base Indicated MDC

Row 1 presented the MDC indicated method outlined above and described in more detail in Section 5.

Row 2: Company-size ("Size Adjusted")

The indicated MDC is sensitive to the fact that company-size is not reflected in Line 4 Factors.

Larger companies exhibit both greater diversification and, independently, a lower indicated risk charge. Therefore, part of the apparent diversification effect can be attributed to size.

Notwithstanding that analysis, we do not "remove" the effect of size from the MDC calibration, as our goal is to produce an MDC reflecting the structure of the RBC Formula, which does not reflect variation in risk charge by company-size.

The NAIC could reasonably make a different choice in the treatment of company-size differences and MDCs.

Row 3: Use RBC Filing Data ("AS+RBC")

The base analysis uses Annual Statement (AS) data for both Two-Year LOBs and Ten-Year LOBs. However, RBC Filing data (RBC data) for Two-Year LOB data has certain advantages relative to AS data.[27]

Working with NAIC personnel, we attempted to match AS company/years with RBC company/years, replacing the AS LOB data point with a higher-maturity RBC data point. This match was only partially successful.[28]

Due to limited access to RBC source data, we rely on AS data for our base indications. The NAIC could reasonably make a different choice.

Rows 4-6: Selected Size/Diversification Cells

The indicated MDC uses 9 cells, C3-E5. There is a significant degree of variability in the indicated MDC from each of those cells, especially for the reserve. Using subsets of those 9 cells produces different indicated MDCs, again, especially for the reserve MDC.

In Section 6, we provide more details on the variation in the indicated MDC by size/diversification band.

Row 7: Regression Analysis

We use regression through the origin to test the hypothesis that there is a linear relationship between CoMaxLine% and indicated diversification credit by level of diversification. The slope of the regression curve represents an indicated MDC.

- For premium, the regression slope is very similar to the average of the 9 cells.
- For reserves, the regression slope is lower than the average of the 9 cells.

Row 8-9: Alternative Time Periods

The base analysis uses AYs 1988-2017 for premium and initial reserve years 1988-2016 for reserves (referred to as "2017 (2016)" below). That covers a range of inflation/interest and underwriting environments, which we believe is appropriate.

[27] In AS data, for Two-Year LOBs, the maximum maturity for LRs and for RRRs is two years, but it is ten years in RBC data. For Two-Year LOBs, the RBC data includes only companies that are subject to RBC, while the AS data includes all companies.

A disadvantage of RBC data is that it does not include Prior Year data for reserve development, while AS data does.

[28] RBC Filing data and AS data have claims at different valuation dates, for the same AY or initial reserve year. Therefore, the RBC Filing data and AS data may be assigned to pools differently, and will not "match." Also, companies in runoff will have reserve data in only the "prior" row of Schedule P. Prior row data is not reported in RBC Filings. Not all companies make RBC filings.

When there was no matching year, we used the AS values for Two-Year LOBs.

When we divide the experience into two equal periods--1988-2002 and 2003-2017 (2016)--the earlier period shows substantially lower MDCs, suggesting greater between-line dependencies than in the more recent period. This might be a statistical fluctuation due to variability in the indicated MDCs[29] and because the more recent data is less mature than the older data.

However, two other features that might contribute to this difference are lower catastrophe activity and higher inflation/interest rates in the earlier period. We discuss these issues further in Section 7.

Summary of Alternative Indicated MDCs

While there is a range of indicated MDCs, any of these alternatives indicates an MDC in excess of 30%, the current MDC.

Issues for Future Research

Interaction of Diversification Credit and IIA (Section 7 and Appendix 2)

The indicated diversification credit is **calibrated** based on LR and RRR data on a **nominal value** (NV) basis, not a present value (PV) basis. However,

- The diversification credit is **applied** to premium/reserve risk on RBC PR0017 and PR0018 Line 13 after application of the IIA, i.e., **PV basis**, and
- If the diversification credit (based on NV analysis) were applied to the risk charge before the IIA (i.e., NV basis), the effect of the diversification credit would be larger, and the RBC value would be smaller.

We discuss this further in Section 7/Additional Considerations and Appendix 2

We have not evaluated this issue sufficiently to recommend a change in the RBC Formula.

Effect of Changes in Interest Rate/Inflation Environment (Section 7)

Report 2 showed that there is an interaction between Line 4 risk factors and interest/inflation rates. To address that interaction, we evaluated indicated risk charges on a present value (PV) basis--Line 4 risk factors and Line 7/8 IIA Factors combined. We separated these into NV Line 4 Factors and IIA Factors, which, combined, produced the target PV risk charges.

In this Report, we calibrate the indicated MDC based on a comparison of NV Observed Risk and NV Modeled Risk. In doing this, we assume that the ratio of PV Observed Risk Value to PV Modeled Risk Value is comparable to the corresponding NV ratios.

We discuss this assumption further in Section 7.

[29] Looking across the 9 cells, C3-E5, variability is large. The values for early-year and later-year indicated MDCs are within one standard deviation of the all-year indicated MDC for reserve risk. See Table 5-2 A and B for values of the standard deviation.

Finding 4:
The treatment of the IIA/Diversification interaction and the effect of a fully PV analysis are matters for future research.

Other Areas of Future Research

There are other areas of future research that we identify in this Report. We list those in Finding 5, below.

Finding 5:
Other areas of future research for dependency analyses that we identify in this Report are the following:

Calibration net of cats covered by R-Cat
Resolving issues in combining RBC and AS data
Within the CoMaxLine% approach, or any alternative, test square, square root, or other relationships between diversification index and diversification credit, rather than the current linear relationship.

General Considerations:

Ratemaking versus Risk Theory (Appendix 3)

RBC calibration is often understood in the context of risk theory. However, there are limitations to that framework, as outlined below.

Individual Company Capital Model Calibration: Grounded in Risk Theory

In an individual company capital model (ICCM), each LOB has a company-specific risk distribution, reflecting its underwriting, claims, reinsurance, and other practices. These company-specific LOB risk distributions are aggregated using empirically-derived or expert judgment-based correlations.

RBC Calibration: Grounded in Risk Classification

Unlike the ICCM, the RBC Formula is calibrated from, and applies to, a heterogeneous population of insurers. The ICCM risk correlation assumptions do not apply.

Variation in Risk within LOB

Consider Company 1A (writing LOB A), Company 1B (writing LOB B), and Company 2 (writing LOBs A and B). Company 2 is more diversified than either Company 1A or Company 1B. Risk theory suggests that the risk charge for Company 2 should be lower than the sum of the risk charges for Company 1A plus Company 1B, depending on the degree of correlation between the LOBs.

However, that expectation assumes that the risk distributions for LOBs A and B in Companies 1A and 1B are the same as the risk distributions for LOBs A and B in Company 2, respectively.

That assumption is not routinely valid. See Appendix 3 for examples.

Risk Classification Provides a Better Conceptual Framework

Therefore, risk classification and manual ratemaking provide a better framework for reflecting diversification in RBC. Specifically, in the risk classification framework, calibrating dependency

means measuring the extent to which companies writing more LOBs have different indicated all-lines risk charges than companies writing fewer LOBs.[30]

In this Report, diversification calibration means:

- The total credit for diversification is estimated empirically as we present in Tables 5-2A and 5-2B. This measurement is analogous to calculating the statewide indicated rate levels in manual ratemaking.
- Diversification is a "risk characteristic" that can be used to allocate credits across degrees of diversification using a reasonable formula, e.g., CoMaxLine%, CoMaxLine%-Risk, and Correlation Factor. This is analogous to setting territorial rate differentials.
- Not all risk characteristics are used in a particular risk classification system, e.g., company-size is not used.
    - The RBC Formula does not consider risk characteristics like company-size, Type of Company, or variations in LOB sub-segments that are not in the Formula.
    - Instead, the calibration considers aggregates across those risk characteristics.
- The Formula is intended to be reasonable overall, but will not be "exact" for any particular insurer.

Calibration Safety Level (Section 7)

There is no explicit overall safety level target for the CAL level in the P&C RBC Formula. Nonetheless, we understand that the prevailing regulatory view is that the implicit safety level has produced satisfactory results.

The indicated MDCs presented in this report are larger than the MDC in the RBC Formula. This suggests that the current RBC Formula incorporates some conservatism in the underwriting risk elements, relative to the 87.5th percentile/runoff time horizon safety level. Thus, even though the Line 4 Factors are calibrated at the 87.5th percentile, the Line 4 Factors combined with the conservative MDCs produced a safety level higher than the 87.5th percentile.

To maintain a satisfactory overall safety level for CAL, adopting a significant change to any element of the RBC Formula should include an assessment, possibly on a judgment basis, of whether the resulting overall impact on the safety level is appropriate, and then to what extent a reduction (or increase) in one area might indicate a corresponding increase (or decrease) in another area to achieve the desired overall level.[31]

[30] More precisely, we measure diversification using CoMaxLine%, but that correlates to the number of LOBs written.

[31] Since the implementation of the RBC Formula there have been changes that have increased the implied safety level (e.g., RCAT set at the 1-in-100 safety level and the addition of the operational risk charge at 3% of RBC). There have also been changes that decreased the implied safety level (e.g., reduced fixed income risk charges for assets and reduced reinsurance credit risk charges).

Specifically, adopting the indicated MDC in the RBC Formula reduces the safety level for R4 and R5, and therefore CAL.

We do not measure the impact of adopting the indicated MDCs on R4, R5, or CAL safety levels, nor do we determine whether the total ACL is appropriate for regulatory purposes. That is beyond the scope of this Report.

4. DATA

For our analysis of the RBC diversification formula, we construct all-lines data points for each available company (pool)/year.[32,33] Each point represents either a premium or a reserve risk observation, i.e., a premium amount and LR or an initial reserve amount and RRR. Following the data treatment in Reports 1 and 2, we combine the data for multiple companies that pool their experience into a single "pooled" data point.

- For premium risk, the all-lines net earned premium (NEP) for each company-AY data point is the sum of the NEP across all LOBs in the risk dataset.

  For each company-AY, the all-lines loss ratio (LR) is the NEP-weighted average of LRs by LOB.

- For reserve risk, the all-lines initial reserve for each company-initial reserve date is the sum of the initial reserves across all LOBs in the reserve risk dataset.

  For each company-initial reserve date, the reserve risk is the all-lines average reserve runoff ratio (RRR) weighted by the initial reserves of each LOB.

There are approximately 50,000 all-lines data points each for premium risk and for reserve risk, totaling roughly 100,000 data points. We classify each data point by company-size and diversification as described below.

Company Size Bands

For each data point, i.e., each company/year, we measure size using either all-lines NEP (for premium risk) or all-lines initial reserve (for reserve risk). We assign each data point to one of five company-size bands, such that 20% of the data points fall into each. We label these company-size bands A (smallest) through E (largest).[34]

Company Diversification Bands

Separately for premium and reserves, for each company/year, we define the diversification index as 1.0-CoMaxLine%.[35] We assign each data point to one of six diversification bands:

[32] Our risk data includes AYs 1988-2017 and initial reserve years 1988-2016. from Annual Statements 1997-2017.

Unlike the data in Reports 1 and 2, our data for this analysis includes Minor Lines, and "new" LOBs, i.e., LOB-age<5. LOB data can be zero or negative, but we exclude data points with negative total premium or initial reserve. Following the RBC Formula, we calculate the CoMaxLine% using zero for negative LOB premium or reserves values.

[33] We assume the reader is familiar with the methods, data, and conclusions presented in the Committee's April 2021 and August 2023 Reports, to the extent that provides the basis for the risk data we use in this analysis.

[34] Band A includes companies with premium/reserves at percentiles greater than or equal to 0% and less than 20%. Band B includes companies with premium/reserves at percentiles greater than or equal to 20% and less than 40%. Similarly for bands C and D. Band E includes companies with premium/reserves at percentiles greater than or equal to 80%, including 100%, the" largest" data point.

[35] A company with 25% of its business in the largest line has a diversification index of 75% (100% - 25%). A monoline company, with 100% of business in the largest (and only) LOB has diversification index of 100% minus 100% or zero.

- Band "0" contains company/years with a zero diversification index, which are considered monoline companies.[36]
- Bands 1-5 are five levels of diversification, each with 20% of the remaining (non-monoline) companies.[37]

Number of All-Lines Data Points by Size and Diversification

Tables 4-1A and 4-1B, below, show the number of data points by company-size and diversification band, for premium risk and reserve risk, respectively.

Table 4-1A
Premium
Number of Data Points by Company Size/Diversification Band

Div	Size Band					
Band	A	B	C	D	E	Total
0	5,067	3,303	2,003	1,393	1,065	12,831
1	1,509	1,728	2,017	1,637	1,013	7,904
2	1,478	1,717	1,804	1,812	1,091	7,902
3	1,318	1,605	1,752	1,801	1,426	7,902
4	878	1,496	1,703	1,789	2,036	7,902
5	219	619	1,189	2,037	3,838	7,902
Total	10,469	10,468	10,468	10,469	10,469	52,343

Table 4-1B
Reserve
Number of Data Points by Company Size/Diversification Band

Div	Size Band					
Band	A	B	C	D	E	Total
0	5,337	3,216	2,520	1,562	1,083	13,718
1	961	1,623	1,809	1,891	1,102	7,386
2	1,201	1,568	1,556	1,530	1,526	7,381
3	1,284	1,568	1,540	1,485	1,507	7,384
4	1,035	1,327	1,471	1,749	1,802	7,384
5	313	822	1,231	1,910	3,108	7,384
Total	10,131	10,124	10,127	10,127	10,128	50,637

[36] For our purpose, monoline means only one LOB has a premium/reserve greater than zero. Thus, band zero includes companies where one or more LOBs have negative premium/reserves and but only one LOB has positive premium/reserves.

[37] We define diversification bands 1-5 in the same way as for size bands, as described in footnote 34.

In these tables, we observe:

- Roughly 13,000 premium and reserve data points are classified as monoline (Div=0), representing 25% of the premium and 27% of the reserve data points.[38] This reflects that data points are individual company/years or pool/years, but not company group/years.
- Monoline companies (Div Band 0) tend to be smaller.
- The most diversified companies, in the row Div Band=5, tend to be larger.
- Nonetheless, even the largest size (band E) includes companies across all diversification levels.
- Almost all size-diversification cells include more than 1,000 data points.

All-Lines Risk Data – Premium/Reserves – by Size and Diversification

Tables 4-2A and 4-2B, below, show NEP and initial reserves by company size/diversification. These tables highlight that both premium and reserve volumes are heavily concentrated in the largest and most diversified segments.

Size Band E

- Over 90% of the premium and reserve volume falls in size band E.
- Over 39%of the total NEP/reserves are in cell E5 (largest size/most diversified)

Size/Diversification Bands C3-E5

- For premium, cells C3-E5 include 34% of companies and 84% of premium.
- For reserves, cells C3-E5 include 31% of companies and 74% of initial reserves.

Table 4-2A
Premium Volume Data[39]
NEP ($millions) by Company Size/Diversification Band

Div	Size Band					
Band	A	B	C	D	E	Total
0	3,205	12,809	26,281	69,325	437,778	549,398
1	1,146	6,944	26,962	77,997	356,626	469,676
2	1,080	6,918	24,826	90,416	714,390	837,630
3	968	6,484	24,603	88,998	1,823,068	1,944,122
4	735	5,937	23,388	87,751	2,174,754	2,292,566
5	211	2,677	16,676	109,209	5,162,054	5,290,827
Total	7,345	41,769	142,736	523,698	10,668,670	11,384,217

[38] 12,831 of 52,343 data points for premium and 13,718 of 50,637 data points for reserves.

[39] This total excludes data points with zero all-lines premium. These totals treats negative premium by LOB as zero premium.

Table 4-2B[40]
Reserve Volume Data
Initial Reserve ($millions) by Company Size/Diversification Band

Div Band	Size Band					
	A	B	C	D	E	Total
0	1,375	8,293	25,860	68,771	1,263,400	1,367,699
1	369	4,535	19,594	86,164	604,874	715,535
2	457	4,122	17,284	71,169	1,469,595	1,562,626
3	473	4,177	17,139	67,627	1,502,865	1,592,280
4	392	3,467	16,424	78,303	3,049,031	3,147,617
5	140	2,308	13,847	93,964	5,559,384	5,669,643
Total	3,205	26,901	110,147	465,999	13,449,149	14,055,402

Dollars of Diversification Credit – by Size and Diversification

Table 4-3A (Premium) and 2-3B (Reserves), below, present the dollar value of diversification credits under the current RBC Formula with the current 30% MDC, before application of the IIA.[41] The data show:

- Companies in cells C3-E5 receive 96% of the total premium diversification credit and 97% of the reserve diversification credit,[42]
- Cell E5 alone accounts for more than 60% of the total diversification credit.[43]

Because the impact is so heavily concentrated in cells C3-E5, we focus on these 9 cells when estimating the indicated MDC.

Table 4-3A
Dollars ($millions) of Diversification Credit (Premium)
Total Premium Diversification Credit by Company Size/Diversification Band

Div Band	Size					
	A	B	C	D	E	Total
0	0	0	0	0	0	0
1	6	34	135	469	1,556	2,199
2	18	122	418	1,611	11,239	13,408
3	23	174	621	2,360	41,441	44,619
4	25	207	807	3,103	74,330	78,472
5	9	116	716	4,858	252,685	258,384
Total	81	652	2,696	12,402	381,251	397,082

[40] This total excludes data points with zero all-lines reserves. This total treat negative reserves by LOB as zero reserves.

[41] This is calculated as Modeled Risk before diversification minus Modeled Risk after diversification, where those values are defined in Section 5.

[42] 380,921/397,082 = 96% for premium and 748,817/773356 = 97% for reserves.

[43] 252,685/397,082 = 64% for premium and 477,306/773356 = 62% for reserves

Table 4-3B
Dollars ($millions) of Diversification Credit (Reserves)
Total Reserve Diversification Credit by Company Size/Diversification Band

Div	Size Band					
Band	A	B	C	D	E	Total
0	0	0	0	0	0	0
1	1	15	66	306	2,333	2,720
2	7	62	255	1,113	19,873	21,309
3	15	136	573	2,403	61,775	64,902
4	19	176	863	4,417	193,565	199,039
5	10	155	1,026	6,889	477,306	485,385
Total	51	544	2,782	15,128	754,851	773,356

5. ANALYSIS OF LCF/PCFS

In this Section, we evaluate the following key assumptions of the RBC diversification approach:

- The 30% MDC
- The assumption that diversification credit is proportional to CoMaxLine%

Part 1 -Indicated MDC

We calculate the indicated MDC for each size/diversification band using the observed and modeled risk ratios and CoMaxLine% values corresponding to those segments. We define these terms below.

Observed Risk Ratio (Diversified)

Premium

For premium risk, for each company/year, we define the Observed AY Underwriting Gain/Loss (Observed AYUL$ in dollars and Observed AYUL%, as a percentage of premium) as the all-lines average LR plus company expense ratio minus 100%.

The LR is the NEP-weighted average LR by LOB for each company/year. The expense ratio is the industry average expense ratio by LOB, weighted by the company/year net earned premium by LOB.

For each size/diversification band or combination of bands, the observed risk ratio is the 87.5th percentile Observed AYUL% across data points within each size/diversification band.[44]

Reserves

For reserves, for each size/diversification band or combination of bands, the observed risk ratio is the 87.5th percentile RRR across data points within each size/diversification band.

Calculation Notes

Note that for each company/year premium or reserve data point, the observed risk ratio inherently reflects diversification across the LOBs.

When calculating observed risk, within a particular size/diversification band, or a combination of bands, we assign each data point equal weight, regardless of premium or reserve volume.

Modeled Risk Ratio Before Diversification

We calculate the Modeled Premium Risk and Modeled Reserve Risk using the RBC Formula applied to the LOB premium and reserve values for each data point.

Premium:

For each company/year, we calculated the Modeled Risk as follows:

[44] The premium and reserve risk factors adopted by the NAIC (Line 4 of the RBC Formula) are based on the 87.5th percentile safety level for the RBC CAL. We calibrate the LCF/PCF to the same safety level. The diversification relationship might be different if the safety level were a different value, e.g., the 90th percentile. We have not calculated the MDC at the 90th percentile safety level.

- The all-lines average premium risk factor is the NEP-weighted average of the LOB-specific premium risk factors.
- The company expense ratio is the average industry expense ratio by LOB, weighted by the company/year net earned premium by LOB.
- The Modeled Risk before diversification is the all-lines average premium risk factor, plus the company expense ratio minus 100%.

The overall Modeled Risk before diversification, as a percentage of premium, is the unweighted average of the company/year Premium Modeled Risk values within each size/diversification band or combination of bands.

Reserve:

Similarly, for each company/year, the all-lines average reserve risk charge is the average of the LOB reserve risk factors weighted by the company/year initial reserve by LOB.

The overall all-lines reserve risk charge before diversification, as a percentage of reserves, is the unweighted average of the company/year Reserve Modeled Risk percentages within each size/diversification band or combination of bands.

Modeled Risk Calculation Simplifications

These modeled risk calculations reflect several simplifications relative to the full RBC Formula.

- First, we evaluate experience on an undiscounted (nominal value, or NV) basis rather than the present value (PV) basis used in Report 2, and, accordingly, we do not apply the investment income offset in the modeled risk calculation.[45]
- Second, we do not apply the own-company adjustment factor, the loss-sensitive contract adjustment factor, or the growth risk charge.[46]
- Third, for company expenses, we use the average of the industry average expense ratio (2017) by LOB, weighted by the company-specific premium by LOB, rather than the company's own all-lines expense ratio.[47]
- Also, we use NEP in place of NWP.

Calculation of MDC – "D5" Companies

Table 5-1, below, presents the calculation of the indicated MDC for companies in Size Band "D" (60th to 80th percentile of size) and Diversification Band "5" (80th to 100th percentile of multi-line diversification).

[45] We discuss the PV/NV treatment in more detail in Section 7.

[46] We have not tested the effect of these simplifications. That said, we note, however, that the effect of including growth risk charge would increase the Modeled Risk and therefore likely increase the indicated MDCs. The effect of the own-company adjustments could be to increase or decrease the Modeled MDCs. In Section 5 we discuss the interaction of the IIA and implementation of the diversification credit.

[47] In the Sensitivity Section, below, we discuss the effect of some of this assumption.

Table 5-1
Sample Calculation of Indicated MDC
Size Band D/Diversification Band 5

	(1)	(2)	(3)
#	Item	Premium	Reserves
1	Observed Risk - 87.5th Percentile	15.8%	25.9%
2	Modeled Risk - 87.5th Percentile before diversification credit	21.0%	38.0%
3	Indicated Diversification Credit[1.0-(1)/(2)]%	25.0%	32.0%
4	Average Diversification Credit(Current Formula)	21.0%	19.2%
5	Indicated Maximum Credit [(3)/(4)]*30%	36%	50%

We display rounded values, but we calculate with unrounded values. Therefore, calculations using the rounded values shown may not exactly reproduce the displayed rounded results.

This applies to all Tables and Exhibits in this Report.

These calculations are as follows:

- Row 1 is the observed risk ratio equal to the 87.5th percentile AYUL% and RRR.
- Row 2 is the modeled risk ratio, before diversification, from the RBC Formula.
- Row 3 is the indicated diversification credit calculated from rows 1 and 2 as shown in row 3.
- Row 4 is the average diversification credit for this size/diversification band produced by the current RBC Formula (which reflects the current 30% MDC).
- Row 5 is the indicated MDC, calculated as shown on row 5.

Because the modeled risk before diversification (row 2) exceeds the observed diversified risk (row 1), some diversification credit is warranted. Row 3 shows indicated diversification credits of 25.0% for premium and 32.0% for reserves. These represent the level of credit that reconciles modeled risk with the observed risk.

Row 4 represents the diversification credit, utilizing the current 30% MDC. Since row 3 exceeds row 4, the indicated MDC is higher than 30%.

Row 5 shows that the indicated MDCs are 36% and 50%, which are higher than the current 30%.

Accordingly, the diversification formulas indicated for this cell would become:

- PCF = 64% plus 36% * CoMaxLine%$_{premium}$
- LCF = 50% plus 50% * CoMaxLine%$_{reserve,}$

where 36% and 50% replace the 30% MDC in the current RBC Formula.

Calculation of MDC – 30 Segments

Tables 5-2A and 5-2B, below, extend the Table 5-1 framework to each of the 30 size/diversification segments and sub-totals.

Table 5-2A Premium
Indicated MDC by Size/Diversification (5x6 Analysis)

Divers Band	Observed Risk (Part 1) Size Band Quintiles					AllSize
Quintiles	A	B	C	D	E	> 20%
0	70%	32%	26%	27%	39%	31%
1	67%	27%	29%	25%	28%	27%
2	48%	26%	22%	18%	18%	20%
3	52%	21%	18%	18%	16%	18%
4	45%	18%	16%	16%	14%	16%
5	83%	24%	15%	16%	14%	15%
All	62%	26%	22%	19%	18%	21%
All ex 0	57%	24%	21%	18%	16%	19%
	C3-E5 Unweighted	16.0%	Weighted	15.7%		

Divers Band	Modeled Risk No Diversification (Part 2) Size Band Quintiles					AllSize
Quintiles	A	B	C	D	E	> 20%
-	31%	32%	36%	46%	63%	40%
1	25%	27%	29%	32%	35%	30%
2	21%	23%	22%	23%	23%	23%
3	19%	21%	20%	21%	22%	21%
4	22%	21%	21%	21%	22%	22%
5	22%	21%	21%	21%	22%	22%
All	26%	26%	25%	27%	28%	26%
All ex 0	22%	23%	23%	23%	24%	23%
	C3-E5 Unweighted	21.3%	Weighted	21.4%		

Divers Band	Indicated Diversification Credit (Part 3) Size Band Quintiles					AllSize
Quintiles	A	B	C	D	E	> 20%
0	-128%	1%	28%	42%	38%	23%
1	-173%	2%	-1%	21%	22%	11%
2	-130%	-16%	1%	23%	23%	9%
3	-168%	1%	11%	14%	28%	15%
4	-109%	15%	23%	24%	37%	27%
5	-277%	-16%	26%	25%	37%	29%
All	-139%	0%	15%	29%	35%	22%
All ex 0	-160%	-2%	11%	24%	34%	20%
	C3-E5 Unweighted	25.0%	Weighted	26.5%		

(Part 3) = 1 - (Part 1)/(Part 2)

Divers Band	Calculated Diversificaiton Credit (Part 4) Size Band Quintiles					AllSize
Quintiles	A	B	C	D	E	> 20%
0%	0%	0%	0%	0%	0%	0%
1	2%	2%	2%	2%	2%	2%
2	8%	8%	8%	8%	8%	8%
3	12%	12%	12%	13%	13%	13%
4	16%	16%	16%	16%	17%	16%
5	20%	21%	21%	21%	22%	21%
All	5%	7%	9%	11%	14%	10%
All ex 0	9%	10%	11%	12%	15%	12%
	C3-E5 Unweighted	16.6%	Weighted	17.2%		

(Part 4) = Diversification Credit Calculated (Current RBC)

Divers Band	Indicated Max Diversification Credit (Part 5) Size Band Quintiles					AllSize
Quintiles	A	B	C	D	E	> 20%
0						
1	-2614%	26%	-17%	328%	348%	178%
2	-500%	-63%	2%	86%	87%	35%
3	-405%	3%	28%	33%	68%	35%
4	-206%	28%	42%	44%	67%	50%
5	-413%	-23%	38%	36%	52%	41%
All	-890%	0%	51%	80%	76%	66%
All ex 0	-528%	-5%	30%	58%	66%	48%
	C3-E5 Unweighted	45.1%	Weighted	45.9%		
	StdDev	13.5%	StdDev	12.9%		

(Part 5) = 0.30 * (Part 3)/(Part 4)

Notes: See Notes to Table 5-2B

Each table includes the following:

- Parts 1-5 in this Table are analogous to rows 1-5 in Table 5-1.
- Part 1 – Each cell is the 87.5th percentile AYUL% or RRR for all data points in that cell. We refer to this as Observed Risk
- Parts 2 and 4 – Each cell is the average of modeled risk (before diversification) and diversification credit, respectively, for all data points in the cell; each point counts equally.
- Parts 3 and 5 – Indicated Diversification Credit and Indicated MDC, calculated using the formulas shown in the Table at the bottom of each of those Parts.
- The label “C3-E5 unweighted” means the simple average of the 9 cells, C3 to E5.

- The label "C3-E5 weighted" means average of the values in the 9 cells, C3 to E5, weighted by the number of company/year data points per cell (see Tables 2-1A and 2-1B for the number of data points by cell).
- StdDev, at the bottom of Part 5, is the standard deviation for the 9 cells C3-E5.
    - Unweighted means each of the 9 cells is weighted equally.
    - Weighted means each of the 9 cells has a weight equal to the number of company/years in that cell.

Table 5-2B Reserves
Indicated MDC by Size/Diversification (5x6 Analysis)

Divers Band	Observed Risk (Part 1) Size Band Quintiles					
Quintiles	A	B	C	D	E	AllSize > 20%
0	58%	41%	28%	25%	18%	29%
1	50%	53%	24%	23%	15%	27%
2	53%	42%	28%	21%	13%	25%
3	57%	41%	31%	25%	18%	28%
4	49%	42%	33%	27%	25%	30%
5	75%	36%	30%	26%	25%	27%
All	56%	43%	28%	25%	21%	28%
All ex 0	54%	43%	29%	25%	21%	27%
	C3-E5 Unweighted	26.7%	Weighted	26.4%		

Divers Band	Modeled Risk No Diversification (Part 2) Size Band Quintiles					
Quintiles	A	B	C	D	E	AllSize > 20%
0	33%	35%	36%	37%	31%	35%
1	29%	29%	29%	30%	31%	29%
2	29%	31%	30%	32%	31%	31%
3	32%	33%	34%	36%	39%	36%
4	34%	35%	37%	38%	42%	38%
5	37%	36%	39%	38%	42%	40%
All	32%	33%	34%	35%	37%	35%
All ex 0	32%	32%	33%	35%	38%	35%
	C3-E5 Unweighted	38.3%	Weighted	38.7%		

Divers Band	Indicated Diversification Credit (Part 3) Size Band Quintiles					
Quintiles	A	B	C	D	E	AllSize > 20%
0	-75%	-16%	22%	34%	44%	17%
1	-74%	-83%	16%	24%	50%	7%
2	-81%	-37%	7%	34%	58%	20%
3	-75%	-24%	8%	31%	53%	22%
4	-42%	-17%	10%	31%	39%	22%
5	-100%	-1%	23%	32%	40%	32%
All	-73%	-28%	17%	30%	44%	21%
All ex 0	-71%	-33%	14%	29%	45%	21%
	C3-E5 Unweighted	29.8%	Weighted	31.2%		
(Part 3) = 1 - (Part 1)/(Part 2)						

Divers Band	Calculated Concentration Ratio (Part 4) Size Band Quintiles					
Quintiles	A	B	C	D	E	AllSize > 20%
0	0%	0%	0%	0%	0%	0%
1	1%	1%	1%	1%	1%	1%
2	5%	5%	5%	5%	5%	5%
3	10%	10%	10%	10%	10%	10%
4	14%	14%	14%	14%	14%	14%
5	18%	19%	19%	19%	20%	19%
All	4%	6%	7%	8%	11%	8%
All ex 0	8%	9%	9%	10%	12%	10%
	C3-E5 Unweighted	14.5%	Weighted	15.0%		
(Part 4) = 1 - Diversification Credit Calculated (Current RBC)						

Divers Band	Indicated Max Diversification Credit (Part 5) Size Band Quintiles					
Quintiles	A	B	C	D	E	AllSize > 20%
0						
1	-1739%	-2109%	394%	628%	1190%	174%
2	-491%	-229%	43%	215%	367%	124%
3	-232%	-73%	26%	96%	160%	67%
4	-91%	-36%	22%	64%	83%	45%
5	-165%	-2%	36%	50%	61%	50%
All	-554%	-145%	73%	107%	121%	78%
All ex 0	-256%	-117%	47%	88%	109%	64%
	C3-E5 Unweighted	66.5%	Weighted	66.3%		
	StdDev	40.5%	StdDev	37.5%		
(Part 5) = 0.30 * (Part 3)/(Part 4)						

Findings from Tables 5-2A and 5-2B

Table 5-3, below, is a copy of Part 5 of Tables 5-2A and 5-2B, which shows the indicated MDCs, by cell.

If the relationship between diversification credit and CoMaxLine% were perfectly linear, then the values in Table 5-3 would show no clear trend as you move across diversification bands. If there were also no random variation, all the values in Part 5 would be identical regardless of company-size and diversification band.

Also, with those assumptions, if the appropriate MDC were 30%, then all the indicated MDC values in Part 5 would be approximately 30%.

Instead, there is substantial variability in the indicated MDC among 30 size/diversification bands, which we discuss below.

Table 5-3
Indicated MDC by Size Diversification Band

Premium

Divers Band Quintiles	Indicated Max Diversification Credit (Part 5) Size Band Quintiles A	B	C	D	E	AllSize > 20%
0						
1	-2614%	26%	-17%	328%	348%	178%
2	-500%	-63%	2%	86%	87%	35%
3	-405%	3%	28%	33%	68%	35%
4	-206%	28%	42%	44%	67%	50%
5	-413%	-23%	38%	36%	52%	41%
All	-890%	0%	51%	80%	76%	66%
All ex 0	-528%	-5%	30%	58%	66%	48%
	C3-E5 Unweighted	45.1%	Weighted	45.9%		
	StdDev	13.5%	StdDev	12.9%		

Reserves

Divers Band Quintiles	Indicated Max Diversification Credit (Part 5) Size Band Quintiles A	B	C	D	E	AllSize > 20%
0						
1	-1739%	-2109%	394%	628%	1190%	174%
2	-491%	-229%	43%	215%	367%	124%
3	-232%	-73%	26%	96%	160%	67%
4	-91%	-36%	22%	64%	83%	45%
5	-165%	-2%	36%	50%	61%	50%
All	-554%	-145%	73%	107%	121%	78%
All ex 0	-256%	-117%	47%	88%	109%	64%
	C3-E5 Unweighted	66.5%	Weighted	66.3%		
	StdDev	40.5%	StdDev	37.5%		

Smaller companies (Size bands A and B)[48]

For these companies, the indicated MDCs are generally negative, implying a diversification surcharge, rather than credit.

We understand this to be because the indicated risk charge for small companies is higher than the Line 4 Factors in the RBC Formula.

In Appendix 1, we examine the relationship between company-size and Line 4 risk factors.

Low Diversification Bands – Diversification Bands 1-2)/Company Sizes C-E

For these companies, the indicated MDCs are generally high.

[48] As we noted, the Modeled Risk before Diversification is based on certain simplifications. In particular, it does not reflect the own-company adjustment or the growth risk adjustment. If Modeled Risk had included those elements of the RBC Formula the differences between companies by size and diversification might have been reduced. That adjustment was outside the scope of our work.

Low diversification, bands 1-2, means the company specializes in a small number of LOBs. The CAS Dependency and Calibration Working Party (DCWP) Report 8, *Differences in Premium Risk charge by Type of Company*,[49] showed that specialist companies[50] have lower than average Line 4 charges for their primary LOBs.

The favorable effect of "specialization" is not reflected in the RBC Line 4 Factors. Therefore, it appears in this analysis as an indicated increase in diversification credit as evidenced by a higher indicated MDC. An examination of the benefit of specialization is outside the scope of this project, and we do not use the experience of the low diversification bands in the indicated MDC.

Larger/more diversified companies – Cells C3-E5

Table 5-3, above, shows the range of values for these cells:

- Premium: Indicated MDCs range from 28% (C3) to 68% (E3); average >45%.
- Reserves: Indicated MDCs range from 22% (C3) to 160% (E3); average >65%.

It also shows the standard deviation across the 9 cells:

- For premium, the standard deviation is 12.9%, compared to the mean of 45.9%, a coefficient of variation of 30%.

  For reserves, the standard deviation is 37.5%, compared to the mean of 66.3%, a coefficient of variation of 57%.

Thus, there is notable variability within that range.

One factor contributing to variability is company-size. In Appendix 1, we calculate the indicated MDCs with risk factors that vary with company-size. The variability after that adjustment is reduced, as follows:

- For premium, the standard deviation is 6.1%, compared to the mean of 42.0%, a coefficient of variation of 15%.
- For reserves, the standard deviation is 25.2%, compared to the mean of 56.2%, a coefficient of variation of 45%.

MDC Indication

The variability, even after the size adjustment, suggests that there are many factors contributing to the differences between companies with increased diversification by LOB.

This makes the selection of the MDC less clear-cut than might be desirable.

[49] Casualty Actuarial Society E-Forum, Spring 2014 1 Risk-Based Capital (RBC) Premium Risk Charges—Differences in Premium Risk Charge by Type of Company.

[50] "Specialist" companies were defined as those with more than 50% of premium in business categories such as "personal," "medical professional," "workers compensation," "reinsurance," etc.

We base our final indicated MDC on the average value in cells C3–E5 (highlighted in yellow). While these nine cells account for only about 34% of premium and 31% of reserve data points, they cover:

- 84% of total premium
- 74% of total reserves
- 95% of total premium diversification credit
- 96% of total reserve diversification credit

Thus, these cells represent the companies with the bulk of policyholders and claims exposure, making them the most relevant for setting diversification parameters.

Most cells in the C3-E5 group imply an MDC higher than the current 30%.

Part 2 – Diversification Credit by Company – Regression Analysis

Tables 5-4 and 5-5, below, use regression through the origin to test the assumption that diversification is linear with respect to CoMaxLine%. This regression analysis also provides a further test of the indicated MDC.

In that regression:

- We use regression through the origin because a diversification formula should yield zero credit when there is zero diversification.
- We apply the regression to data from cells C3-E5, excluding company-sizes A and B and diversifications bands 0-2 for the reasons explained previously.

The regression data in Table 5-4 is as follows:

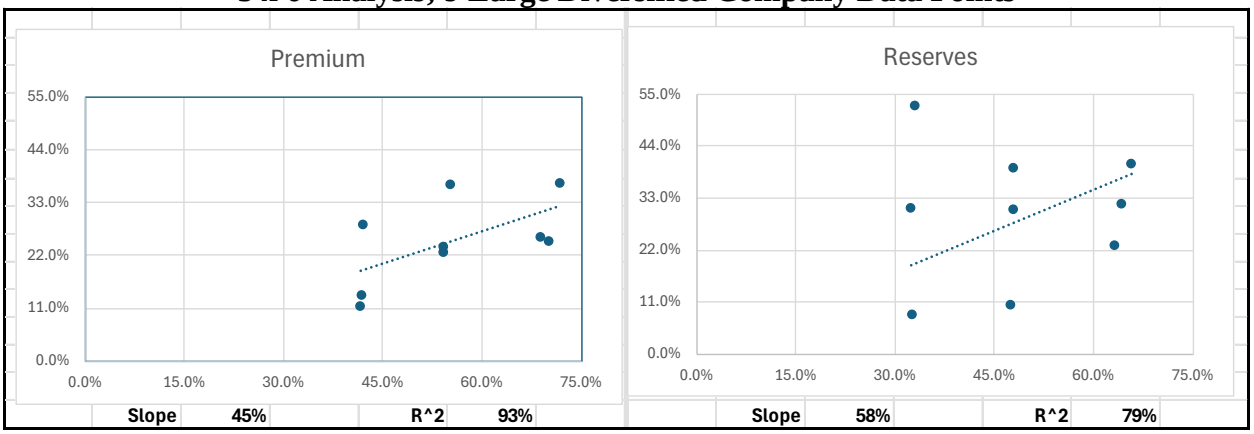
- Columns 1 & 4: Average diversification index for premium and reserve risk, respectively (from Table 5-2A/B, Part 4 divided by 30%).
- Columns 2 & 5: Indicated diversification credit (from Part 3 of Tables 5-2A and 5-2B).
- Columns 3 & 6: Fitted diversification credit, derived from the regression through the origin applied to the prior columns.

Table 5-4
Large Diversified Companies
Graphical Analysis of CoMaxLine% Element of Diversification Formula
5 x 6 Analysis; 9 Large Diversified Company Data Points

		Premium			Reserves		
		(1)	(2)	(3)	(4)	(5)	(6)
Size Band	Div Band	Average Div Index	Indicated Div Credit	Fitted Div Credit	Average Div Index	Indicated Div Credit	Fitted Div Credit
C	3	41.6%	11.5%	18.7%	32.5%	8.3%	18.9%
D	3	41.8%	13.8%	18.8%	32.4%	31.0%	18.8%
E	3	42.0%	28.5%	18.9%	32.9%	52.7%	19.1%
C	4	54.2%	22.6%	24.3%	47.5%	10.5%	27.5%
D	4	54.1%	23.9%	24.3%	47.9%	30.8%	27.8%
E	4	55.1%	36.9%	24.8%	47.7%	39.4%	27.7%
C	5	68.7%	25.9%	30.9%	63.2%	23.0%	36.6%
D	5	70.1%	25.0%	31.5%	64.1%	32.0%	37.2%
E	5	71.7%	37.2%	32.2%	65.7%	40.2%	38.1%

Table 5-5, below, shows Table 5-4 graphically.

Table 5-5
Large Diversified Companies
Graphical Analysis of CoMaxLine% Element of Diversification Formula
5 x 6 Analysis; 9 Large Diversified Company Data Points



In Table 5-5:

- The X-axis represents the average diversification index (Table 5-4 columns 1 and 4).
- The Y-axis represents the indicated diversification credit (Table 5-4 columns 2 and 5)
- The slope of the fitted line is 45% for premiums and 58% for reserves.

The regression "R-squared" values[51] are:

- 93% for premium, and
- 79% for reserves.

This regression analysis evaluates the assumption that diversification is proportional to the CoMaxLine% parameter. The "R-squared" metrics suggest that the proportionality assumption is reasonable, albeit with more variability for reserves than for premiums.

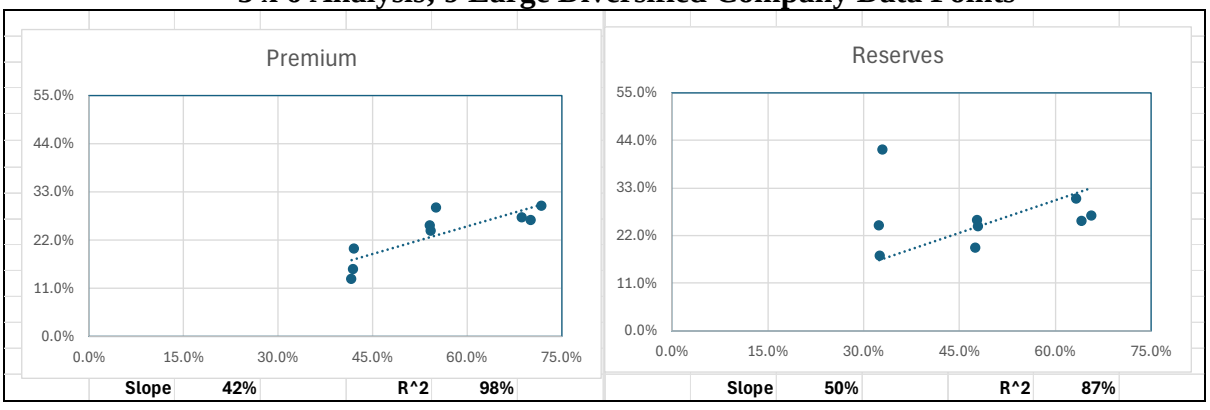
The slopes serve as alternative estimates of the premium and reserve indicated MDCs.

- The premium slope, 45% is essentially the same as the C3-E5 average in Table 5-2A.
- The reserve slope, 58% is not as close to the C3-E5 average, 66%, as the premium slope. In light of the higher variability in the reserve risk regression, our reserve MDC indication is based on the C3-E5 average in Table 5-2B.

Analysis after size adjustment

In Section 6/Sensitivity Analysis, and Appendix 1/Size-Adjusted Indicated MDC, we observe that company-size contributes to both the indicated MDC and the variation in indicated MDC by size/diversification cell. Table 5-6, a copy of Appendix 1-Exhibit A1-4, shows the size-adjusted equivalent of Table 5-5.

Table 5-6
(Copy of Appendix 1 – Exhibit A1-4)
Large Diversified Companies (with Size-Adjusted Risk Factors)
Graphical Analysis of CoMaxLine% Element of Diversification Formula
5 x 6 Analysis; 9 Large Diversified Company Data Points



[51]The R-squared statistic is calculated by Excel regression in Excel data pack. The Excel formula for R-squared for regression through the origin is different from the R-squared formula used for OLS regression. Regression through the Origin by Joseph G Eisenhauer.

Removing the company-size effect improves the quality of the regression. Table 5-6 shows the adjusted regression "R-squared" values:

- 98% for premium and
- 87% for reserves.

This improvement in regression results contributes to the Committee's view that using a linear relationship between CoMaxLine% and diversification credit is reasonable.[52]

[52] There is limited data (nine points) and high variability by size within diversification levels. Therefore, we have not tested the extent to which a non-linear relationship, such as a square or square root relationship between diversification level and diversification credit, might better match the experience.

6. SENSITIVITY ANALYSIS

Alternative Indicated MDCs and Sensitivity Tests

In this Section, we evaluate how changes in assumptions affect the indicated MDC.

Table 6-1, row 1, columns 7 and 8, shows the indicated MDCs that we develop in Section 5, 46% for premium risk and 66% for reserve risk. Rows 2-16, columns 7 and 8, show the indicated MDCs based on the alternative assumptions briefly listed in column 2.

We discuss each of the alternatives in the material following Table 6-1.

Table 6-1 – Alternatives and Sensitivity Analysis
Summary of Indicated Maximum Diversification Charges

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
						Indicated MDC	
Row #	Label	Size/Div Cells	Segments	Data-AS/RBC	Expense Data	Premium	Reserves
1	Base indicated MDC	Wtd C3.E5	5x6	AS only	Industry	46%	66%
1.1	Unweighted Indicated MDC	UnWtd C3.E5	5x6	AS only	Industry	45%	66%
2	Size Adjusted Line 4 Factors	Wtd C3.E5	5x6	AS only	Industry	42%	56%
3	AS + RBC	UnWtd E5.J10	10x11	AS+RBC	Industry	56%	59%
4	Sizes D & E/Div 3-5	Wtd D3.E5	5x6	AS only	Industry	50%	80%
4.1	Size C/Div 3-5	Wtd C3.C5	5x6	AS only	Industry	35%	28%
4.2	Size D/Div 3-5	Wtd D3.D5	5x6	AS only	Industry	38%	68%
4.3	Size E/Div 3-5	Wtd E3.E5	5x6	AS only	Industry	59%	90%
5	Div 4 & 5/Size C-E	Wtd C4.E5	5x6	AS only	Industry	48%	55%
5.1	Div 3/Size C-E	Wtd C3.E3	5x6	AS only	Industry	41%	93%
5.2	Div 4/Size C-E	Wtd C4.E4	5x6	AS only	Industry	52%	58%
5.3	Div 5/Size C-E	Wtd C5.E5	5x6	AS only	Industry	45%	53%
6	Div 4&5/Size D&E	Wtd C4.E5	5x6	AS only	Industry	50%	64%
7	Regression Slope	C3.E5	5x6	AS only	Industry	45%	58%
8	Yrs - 1988-2002	Wtd C3.E5	5x6	AS only	Industry	42%	58%
9	Yrs - 2003-2017 (2016)	Wtd C3.E5	5x6	AS only	Industry	64%	85%
10	Yrs - 1995-2017 (2016)	Wtd C3.E5	5x6	AS only	Industry	43%	67%
11	2022 Line 4 factors	Wtd C3.E5	5x6	AS only	Industry	58%	59%
12	110 Segments	UnWtd E5.J10	10x11	AS only	Industry	46%	67%
13	6 Segments	UnWtd Div 3-5; Size >A	5x6	AS only	Industry	42%	54%
14	1 Segment	Ex A/Ex 0	1x1	AS only	Industry	48%	64%
15	Co Expense	Wtd C3.E5	5x6	AS only	Co	46%	NA
16	DCWP 2010 data	UnWtd C3.E5	5x6	AS+RBC	Industry	54%	70%

AS+RBC = Annual Statement data for Ten-Year LOBs and RBC data for Two-Year LOBs, for company/years where RBC data is available.

Row 1.1 – Unweighted Average cells C3-E5

Row 1.1 shows the indicated MDC based on the unweighted average of cells C3-E5, i.e., weighting each cell equally. The differences compared to row 1 are small, 46% versus 45% for premium and 66.3% versus 66.5% for reserves.[53] We use row 1.1 as the base for certain alternatives that we calculated based on the unweighted average of cells C3-E5.

[53] Each of these rounds to 66% in Table 6-1.

Row 2 – Effect of Company-Size

There is an interaction between (a) company-size and (b) risk factors. This interaction affects the indicated MDC, as follows:

Variation in Indicated Risk Charges by Company-Size

First, Appendix 1-Exhibits A1-1A and A1-1B (Part 3), show that, for premium and reserves, respectively, the indicated LOB risk charges are lower for larger companies, even if they have the same level of diversification as smaller companies.

Company Size and Diversification

Second, larger companies tend to have higher levels of diversification, including within the C3-E5 range. For example, for premium, looking at Table 4-1A:

- The number of E3 companies/years (1,426 for premium) is less than the number of C3 or D3 companies/years (1,752 and 1,801 for premium).
- Conversely, the number of E5 company/years (3,838 for premium) is more than the number of C5 or D5 company/years (1,189 and 2,037 for premium).

For reserves, looking at Table 4-1B, the difference in the number of companies by size level for diversification band 3 is small, but for diversification band 5, the number of companies by size is skewed to large companies. For example, there are 3,108 E5 companies but only 1,231 C5 and 1,910 D5 companies.

Interdependency of Risk Charge by Size and Diversification by Size

Because larger companies independently exhibit both greater diversification and lower risk charges, part of the apparent diversification effect is attributable to size. To assess this impact, in Appendix 1, we adjust the modeled premium/reserve risk charges to reflect company-size. The resulting indicated MDCs, shown in row 2, are lower:

- 42% rather than 46%, for premium, and
- 56% rather than 65% for reserves.[54]

Appendix 1 Exhibits A1-2A and A1-2B show the supporting calculations.

Notwithstanding that analysis, we do not "remove" the effect of size from the MDC calibration, as our goal is to produce an MDC reflecting the structure of the RBC Formula, which does not reflect variation in risk charge by company-size.

Row 3 – Using RBC Filing Data ("RBC data")

In the base analysis, we use Annual Statement (AS) data for both Two-Year LOBs[55] and Ten-Year LOBs.

[54] The variation in risk charge by company-size, for size bands C-E is more significant for reserve risk than for premium risk. Hence the impact on MDC is greater for reserve risk than for premium risk.

[55] RBC Filing data and AS data have claims at different valuation dates, for the same AY or initial reserve year. Therefore, the RBC Filing data and AS data may be assigned to pools differently, and will not "match."

Also, companies in runoff will have reserve data in only the "prior" row of Schedule P, and will therefore not have premium or reserve data in the RBC Filings.

For the Line 4 analysis in Reports 1 and 2, we use RBC data for Two-Year LOBs because the RBC Two-Year LOB data has certain advantages relative to AS data.

- First, RBC data includes LRs and RRRs with maturity up to ten years, longer than the two-year maturity of AS data.
- Second, RBC data includes only companies and LOBs that are subject to RBC requirements. Certain health coverages in LOB L-Other are excluded (governed by Health RBC), and single state monoline financial guarantee companies, LOB S- FG/MG, are not included because they are not covered by RBC.

On the other hand, RBC data does not include the development of Prior Year reserves. This is less significant for the Two-Year LOBs than for the Ten-Year LOBs because the Two-Year LOBs are generally shorter-tailed business, with less prior year reserves.

Merging AS and RBC data is more complex in this dependency analysis than with the Line 4 analysis. The Line 4 analysis evaluates each LOB separately. The dependency analysis requires aggregation across Two-Year LOBs and Ten-Year LOBs to produce the all-line total company/year experience.

Working with NAIC personnel, we attempted to match the AS company/years with the RBC company/years, replacing AS Two-Year LOB data points with higher-maturity RBC data points for those LOBs. This match was only partially successful. When there was no matching year, we used the AS values for Two-Year LOBs.

Using the RBC data, to the extent available, increases the premium indicated MDC and reduces the reserve indicated MDC,[56] as shown in Table 6-2, below, extracted from Table 6-1.

Due to limited access to RBC source data, we rely on AS data for our base indications. The NAIC might reasonably make a different choice.

[56] Technically, the RBC+AS indicated MDCs are based on 110 size/diversification segments rather than 30 size/diversification segments and should be compared to the AS indicated MDCs based on 110 size/diversification segments. The AS-only 110 segment analysis produces indicated MDCs essentially the same as the 30 segment indicated MDC, so the display in Table 3-4 is not misleading.

Table 6-2
Effect of Using RBC data for Two-Year LOBs

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
						Indicated MDC	
Row #	Label	Size/Div Cells	Segments	Data-AS/RBC	Expense Data	Premium	Reserves
1	Base indicated MDC	Wtd C3.E5	5x6	AS only	Industry	46%	66%
3	AS + RBC	UnWtd E5.J10	10x11	AS+RBC	Industry	56%	59%

The RBC data was evaluated with 110 segments, rather than 30 segments, and an unweighted average of the 110-segment equivalent of 9-segment cells C3-E5.

Nonetheless, we compare the AS+RBC indicated MDC to row 1, because the indicated MDC with the unweighted average, row 12, is essentially the same as the indicated MDC.

Rows 4 through 6 – Size/Diversification Segments

The indicated MDC is based on the nine size/diversification cells C3-E5. Tables 6-3 and 6-4 (extracted from Table 6-1), below, show indicated MDCs for different size and diversification combinations within that overall range.

Table 6-3
By Size Level – Combined Diversification Levels
Focus by Size for Diversification 3-5 Combined

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
						Indicated MDC	
Row #	Label	Size/Div Cells	Segments	Data-AS/RBC	Expense Data	Premium	Reserves
1	Base indicated MDC	Wtd C3.E5	5x6	AS only	Industry	46%	66%
4	Sizes D & E/Div 3-5	Wtd D3.E5	5x6	AS only	Industry	50%	80%
4.1	Size C/Div 3-5	Wtd C3.C5	5x6	AS only	Industry	35%	28%
4.2	Size D/Div 3-5	Wtd D3.D5	5x6	AS only	Industry	38%	68%
4.3	Size E/Div 3-5	Wtd E3.E5	5x6	AS only	Industry	59%	90%

Indicated MDC by Company-Size (Diversification bands 3-5 combined)

Table 6-3, above, shows that indicated MDCs increase with size, as follows:

- For premium risk, the indicated MDCs are 35%, 38% and 59% for size bands C, D, and E, respectively, and 50% for D+E, which compares to the overall indicated MDC of 46%.
- For reserve risk the indicated MDCs are 28%, 68% and 90% for size bands C, D and E, respectively, and 80% for D+E, compared with an overall indicated MDC of 66%.

This is consistent with prior observations that, absent a company-size adjustment in risk factors, indicated MDCs will be larger for larger companies.

Indicated MDC by Diversification (Size bands C-E combined)

Table 6-4, below, shows that there is no consistent pattern in indicated MDCs as diversification increases:

- For premium risk, the indicated MDCs are 41%, 52%, and 45%, for diversification bands 3, 4, and 5, respectively, and 48% for diversification bands 4+5, relative to the overall indicated MDC of 46%.
- For reserve risk, the indicated MDCs are 93%, 58%, 53% for diversification bands 3, 4, and 5, respectively, and 55% for diversification bands 4 + 5, relative to the overall indicated MDC of 66%.

Table 6-4
By Diversification Level – Combined Size Levels
Focus by Diversification for Sizes C-E Combined

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
						Indicated MDC	
Row #	Label	Size/Div Cells	Segments	Data-AS/RBC	Expense Data	Premium	Reserves
1	Base indicated MDC	Wtd C3.E5	5x6	AS only	Industry	46%	66%
5	Div 4 & 5/Size C-E	Wtd C4.E5	5x6	AS only	Industry	48%	55%
5.1	Div 3/Size C-E	Wtd C3.E3	5x6	AS only	Industry	41%	93%
5.2	Div 4/Size C-E	Wtd C4.E4	5x6	AS only	Industry	52%	58%
5.3	Div 5/Size C-E	Wtd C5.E5	5x6	AS only	Industry	45%	53%
6	Div 4&5/Size D&E	Wtd C4.E5	5x6	AS only	Industry	50%	64%

Row 6 shows the effect of considering the weighted average of the four cells D4-E5. This 4-cell average indicates a somewhat higher MDC for premium and a slightly lower MDC for reserves.

Row 7 – Regression Analysis

We use regression through the origin to test the hypothesis that there is a linear relationship between CoMaxLine% and indicated diversification credit by level of diversification. The slope of the regression curve represents an indicated MDC. Exhibit 5-5 shows that:

- The regression slope for premium is 45%, which is very similar to the average of the 9 cells, 46%.
- The regression slope for reserves is 58%, which is lower than the average of the 9 cells, 66%.

Rows 8-10 – Years Included

The base analysis uses AYs 1988-2017 for premium and initial reserve years 1988-2016 for reserves. Table 6-5, below, from Table 6-1, shows the indicated MDCs based on alternative year ranges.

Table 6-5
Indicated MDC by Year-Range

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
						Indicated MDC	
Row #	Label	Size/Div Cells	Segments	Data-AS/RBC	Expense Data	Premium	Reserves
1	Base indicated MDC	Wtd C3.E5	5x6	AS only	Industry	46%	66%
	Early 15 Years vs. Recent 15/14 Years						
8	Yrs - 1988-2002	Wtd C3.E5	5x6	AS only	Industry	42%	58%
9	Yrs - 2003-2017 (2016)	Wtd C3.E5	5x6	AS only	Industry	63%	85%
	Most recent Lastest 22/21 years						
10	Yrs - 1995-2017 (2016)	Wtd C3.E5	5x6	AS only	Industry	43%	67%

Note: The indicated Line 4 Factors will vary for each year-range. Therefore, when examining MDC by year-range, we adjust the all-lines average modeled risk factors to reflect differences in indicated risk charges based on the selected year-range relative to the full dataset.

Rows 8 and 9 split the experience into two approximately equal periods—1988-2002 and 2003-2017 (2016 for reserve risk). The earlier period, from 1988 to 2002, exhibits substantially lower MDCs compared to the more recent period. We have not investigated the factors that cause that difference. This might be a statistical fluctuation due to variability in the indicated MDCs[57] and because the more recent data is less mature than the older data.

However, two other factors might contribute are that (a) the 2003-2017 period includes more catastrophe events than the 1988-2002 period,[58] and (b) there were higher inflation/interest rates in the 1988-2002 period than in the more recent period. We discuss these issues further in Section 7.

Row 10 presents the indicated MDC using a recent time frame, 1995-2017. The indicated MDCs are very similar to those in row 1.

Row 11 – 2022 Line 4 Factors

Row 11 shows the indicated MDC where the modeled risk ratios are based on the 2022 Line 4 risk factors rather than the indicated Line 4 Factors.

[57] Looking across the 9 cells, C3-E5, variability is large. The values for early-year and later-year indicated MDCs are within one standard deviation of the all-year indicated MDC for reserve risk. See Table 5-2 A and B for values of the standard deviation.

[58] For example, as we observed in Report 2, page 108, "Continental United States Hurricane Impacts/Landfalls, 1851-2022," the National Oceanic and Atmospheric Agency reports 1.3 hurricane landfalls per year in 1988-2003 and 1.8 hurricane landfalls per year in 2004-2017. NOAA and other sources show a similar relationship for tropical storm landfalls.

All else equal, if the average Line 4 Factors were higher than indicated by experience, then the indicated MDC would be higher than the otherwise indicated MDC, and vice versa.[59]

For premium risk, the average 2022 Line 4 Factor is higher than the indicated Line 4 Factor (0.950 versus 0.934).[60] Accordingly, the indicated MDC is higher when using the 2022 Line 4 Factors (58% using 2022 Line 4 versus 46% using the indicated).

For reserve risk, the average 2022 Line 4 Factor is lower than the indicated Line 4 Factor (0.365 versus 0.385). Accordingly, the indicated MDC is lower when using the indicated Line 4 Factors (59% using the 2022 Line 4 versus 66% using the indicated).[61]

Table 6-6
2022 Factors

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
						Indicated MDC	
Row #	Label	Size/Div Cells	Segments	Data-AS/RBC	Expense Data	Premium	Reserves
1	Base indicated MDC	Wtd C3.E5	5x6	AS only	Industry	46%	66%
11	2022 Line 4 factors	Wtd C3.E5	5x6	AS only	Industry	58%	59%

This highlights that MDCs should be calibrated with experience consistent with the experience used to calibrate Line 4 experience.

Rows 12-14 – Increasing/Decreasing the Number of Size/Diversification Segments.

The base analysis uses 30 size/diversification segments, 5 size bands (A-E) and 6 diversification bands (0-5). Rows 12-14 show the indicated MDC based on alternative segmentations, using more (110) or fewer (6 or 1) segments. The results are summarized below in Table 6-7 (excerpted from Table 6-1).

[59] The modelled risk in the calibration uses the Line 4 risk factors. If the modeled all-lines risk charge increases, the indicated diversification credit will increase to "offset" that. The increase in indicated diversification credit is reflected as an increase in indicated MDC.

[60] In the August 30, 2023, Report 2, Table 1.1A, page 7, we show that the 2022 and indicated average Line 4 Factors are 0.950 and 0.934, respectively, corresponding to risk charges, before IIA, of 22.0% and 20.4%, using industry all-lines average expense ratio of 27.0%.

[61] In the August 30, 2023, Report 2, Table 1.1B, page 8, we show that the 2022 and indicated average Line 4 Factors, before IIAs, are 0.365 and 0.385, respectively.

Table 6-7
Number of Size/Diversification Segments

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
						Indicated MDC	
Row #	Label	Size/Div Cells	Segments	Data-AS/RBC	Expense Data	Premium	Reserves
1.1	Unweighted Indicated I	UnWtd C3.E5	5x6	AS only	Industry	45%	66%
12	110 Segments	UnWtd E5.J10	10x11	AS only	Industry	46%	67%
13	6 Segments	UnWtd Div 3-5; Size >A	5x6	AS only	Industry	42%	54%
14	1 Segment	Ex A/Ex 0	1x1	AS only	Industry	48%	64%

Note: We compare rows 12-14 to row 1.1, rather than row 1, because we have the alternative segmented data on an unweighted basis only.

Row 12: 110 Segments

Row 12 shows the indicated MDC using a more detailed set of 110 cells: 10 size bands segments (A-J), each containing 10% of the companies/years, and 11 diversification bands (0-10), including one for monoline company/years and 10 for multi-line company/years, each containing 10% of the multiline companies.

Row 12 is the indicated MDC using the unweighted average of indicated MDCs for the six largest size bands (E through J) and the six most diversified diversification bands (bands 5 through 10), E5-J10, with each band equally weighted. Compared with the indicated MDC from the unweighted 30-segment average in row 2, the differences are small: 46% versus 45% for premium and 66% versus 67% for reserves.

Row 13: Six segments

Row 13 shows the MDC indicated using fewer segments, specifically one size band (including all companies larger than the smallest 20%) and six diversification bands (0-5), one band for monoline companies and 5 additional bands, each containing 20% of the multiline companies.

Row 13 is the indicated MDC based on the unweighted average of indicated MDCs for diversification bands 3-5, each in one size band, B-E combined.

This more aggregated approach results in lower MDCs, 42% versus 45% for premium and 54% versus 66% for reserves. This 6-segment design includes more smaller companies (Size B), one factor contributing to the lower indicated MDC.

Row 14: One segment

Row 14 shows the MDC indicated using a single broad segment: one size band (excluding the smallest 20%), and all multiline companies (i.e., excluding monoline companies). Compared to cells C3-E5 from the 30-segment approach, this segment includes:

- More smaller companies (Size B), which tends to reduce the MDC, and
- More specialized companies (diversification bands 1-2), which tend to increase the indicated MDC.

Compared to the unweighted 30-segment indicated MDC in row 2, this yields 48% versus 45% for premium and 59% versus 66% for reserves.

Row 15 – Company All-Line Expenses (Premium Risk Only)

Row 15 uses company-specific all-lines expense ratios[62] instead of industry LOB expense ratios weighted by each company's NEP by LOB (as in row 1). Using company-specific expenses aligns more closely with how the RBC Formula is applied.

Table 6-8
Indicated MDC with Industry versus Company-Specific Expenses

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
						Indicated MDC	
Row #	Label	Size/Div Cells	Segments	Data-AS/RBC	Expense Data	Premium	Reserves
1	Base indicated MDC	Wtd C3.E5	5x6	AS only	Industry	46%	66%
15	Co Expense	Wtd C3.E5	5x6	AS only	Co	46%	NA

Table 6-8 above shows that this simplification did not significantly affect the indicated MDC.

The comparison may understate the true effect of the expense simplification. For some company/years, we were unable to construct pooled company-specific expenses that matched the risk data. In those cases, we defaulted to 2017 industry expense ratio data, weighted by company/year LOB premium.

Row 16 – DCWP Analysis Using Data Through 2010.

Row 16 compares the indicated MDCs to the prior DCWP analysis based on data through 2010.[63]

Table 6-9
Comparison of Indicated MDC to Prior DCWP Analysis with 2010 Data

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
						Indicated MDC	
Row #	Label	Size/Div Cells	Segments	Data-AS/RBC	Expense Data	Premium	Reserves
1.1	Unweighted Indicated I	UnWtd C3.E5	5x6	AS only	Industry	45%	66%
16	DCWP 2010 data	UnWtd C3.E5	5x6	AS+RBC	Industry	54%	70%

Note: We compare row 16 to row 1.1, rather than row 1, because the DCWP data is provided on an unweighted basis only.

[62] From company-by-company Insurance Expense Exhibit data.

[63] Report 14 - Calibration of LOB Diversification in Underwriting Risk Charges.

Compared to this analysis, the DCWP analysis:

- Used fewer AYs/reserve years[64]
- Included less mature data for overlapping years
- Excluded LOBs categorized as minor lines, immature AYs/reserve years, and new LOBs that are included in this analysis
- Used a simpler pooling approach.

These data and methodological differences may explain part of the difference in indicated MDCs in this analysis compared to the DCWP analysis.

[64] Considering the years of experience alone, the current analysis using data from 1988-2010 indicated a premium MDC of 39% (versus 54% from the DCWP analysis) and a reserve MDC of 60% (versus 70% from the DCWP analysis).

7. ADDITIONAL CONSIDERATIONS

In addition to the quantitative analysis above, we note the following factors that we do not quantify in this Report:

1. Catastrophe experience and its effect on diversification
2. Apply IIA before or after the diversification credit
3. Effect of Changes in Interest/Inflation Rates
4. Alternative diversification metrics
5. Calibration safety levels

Catastrophe Experience (Premium Risk Only)

Catastrophe Treatment in RBC Formula

In the original RBC Formula, Net Written Premium on PR018 included both catastrophe and non-catastrophe risk. Beginning with year-end 2017 reporting, the RBC Formula introduced a new risk component, R_{CAT}, which covers the earthquake and hurricane components of the total premium risk. The catastrophe risk charge is calculated in RBC form PR027, and companies report their hurricane and earthquake loss experience data in their confidential RBC Filings in forms PR101, PR102, …, and PR122, one form for each LOB.

With the introduction of R_{CAT}, the otherwise applicable Line 4 risk factors in PR018 were reduced to exclude the portion of RBC attributable to those catastrophe risks. For simplicity, we will refer to the remaining premium risk element in PR018 as the non-catastrophe premium risk, although some catastrophe risks, such as wildfires, severe convective storms, and floods, remain in the non-catastrophe data.

Catastrophe Treatment in PCF Calibration

Our analysis of the PCF uses AS data that includes both catastrophe and non-catastrophe experience. Ideally, a diversification analysis would evaluate catastrophe and non-catastrophe experience separately. However, our ability to do so is limited in two respects.

- First, separate catastrophe experience has only been collected in RBC Filings for AYs since 2004[65]— i.e., for only 14 of the 30 years in our analysis.
- Second, the catastrophe experience is available only in confidential RBC Filings, and therefore accessible only to regulators, and not to this Committee, except in a summarized form.

The impact on the indicated MDC of separately considering catastrophe experience and non-catastrophe experience is uncertain. On one hand, catastrophe claims create a correlation between experience across catastrophe-exposed LOBs, which reduces the diversification apparent in our

[65] Accident Year 2004 catastrophe experience in the ten accident years provided in the 2013 RBC filings that contained catastrophe experience on an information basis only.

data and in the indicated MDC. On the other hand, catastrophes may reduce correlation between catastrophe exposed and non-catastrophe exposed LOBs and therefore may increase the diversification apparent in our data and in the indicated MDC.

Moreover, the impact of catastrophes on diversification across catastrophe-exposed LOBs and other LOBs depends on other variables. For example, there may be correlations across LOBs due to market pricing cycles related to catastrophes.

An evaluation of this issue is a matter for future research.

Apply PCF/LCF before or after IIA

The indicated diversification credit is **calibrated** based on LR and RRR data on a **nominal** value (NV) basis, not on a present value (PV) basis.

In the RBC Formula, the diversification credit is implemented through the PCF/LCF, which equals 1.0 – diversification credit. The PCF/LCF credit is **applied** to premium/reserve risk on RBC PR0017and PR0018 risk **after** the IIA discount, i.e., on a **PV basis**.

If the PCF/LCF credit were applied to the risk charge **before** the IIA, the effect of the diversification credit would be larger.

Table 7-1 Part A, below, shows the risk charge calculation with the current method.

Table 7-1A – IIA applied before PCF/LCF – Current Method

Part A -Diversification - Current Method				
Row	Item	Premium	Reserve	Notes
1	Line 4	0.934	0.385	Industry all-line-weighted average
2	IIA	0.927	0.872	Industry all-line-weighted average
3	Expense Ratio	0.270	NA	Industry all-line-weighted average
4	Diversification Credit	0.150	0.150	Industry all-line weighted average
5	PCF/LCF	0.850	0.850	1.0-(4)
6	Risk Charge Before IIA Before Div	0.204	0.385	Note 1
7	Risk Charge After IIA Before Div	0.136	0.208	Note 2
8	Risk Charge After IIA and After Div	0.115	0.177	(6)*(5)
9	Div Credit-% Rsv/Prem	0.020	0.031	(6)-(7)

Values in the Premium and Reserve columns are factors to apply to premium or reserves, respectively.

Note 1: Premium Risk row (5)=(1)+(3) -1.0; Reserve Risk: (5)=row 1.

Note 2: Premium Risk row (5)=(1)*(2)+(3)-1.0; Reserve Risk: (6)=(1.0+(1))*(2)-1.0.

We display rounded values, but we calculate with unrounded values. Therefore, calculations using the rounded values shown may not exactly reproduce the displayed rounded results.

This rounding feature applies to all Tables and Exhibits in this Report.

Table 7-1 Part B, below, shows the risk charge calculation with the alternative method.

Table 7-1B – IIA applied after Diversification – Alternative Method

Part B -Diversification - Apply Diversification Before IIA				
Row	Item	Premium	Reserve	Notes
1	Line 4	0.934	0.385	Industry all-line-weighted average
2	IIA	0.927	0.872	Industry all-line-weighted average
3	Expense Ratio	0.270	NA	Industry all-line-weighted average
4	Diversification Credit	0.150	0.150	Industry all-line weighted average
5	PCF/LCF	0.850	0.850	1.0-(4)
6	Risk Charge Before IIA Before Div	0.204	0.385	Note 1
7	Risk Charge Before IIA After Div	0.173	0.327	(4)*(5)
8	Risk Charge After IIA and After Div	0.107	0.157	Note 2
9	Div Credit as % Rsv/Prem	0.028	0.050	Part A Row 6 - (8)

Values in the Premium and Reserve columns are factors to apply to premium or reserves, respectively.

Note 1: Premium Risk row (5)=(1)+(3) -1.0; Reserve Risk: (5)=row 1.

Note 2: Premium Risk row (5)=(1)*(2)+(3)-1.0; Reserve Risk: (6)=(1.0+(1))*(2)-1.0.

Rows 1-6 in Part B are the same as in Part A. In row 7, we apply the PCF/LCF credit to the risk charge before applying the IIA (shown in row 6). This differs from Part A, the current method, where the PCF/LCF credit is applied after the IIA. Row 8 shows the risk charge after applying both the IIA and the diversification credit with the alternative method.

In row 9, we show the diversification credit as the difference between:

- The risk charge after IIA and before diversification – Part A row 6, and
- The risk charge after IIA and after diversification, alternative method – Part B row 8.

Table 7-1 Part C, below, compares parts A and B. It shows that with the alternative method, the diversification credit is significantly larger, e.g., 39% larger, for premium risk and 62% larger for reserve risk. As a result, the risk charge is 6.9% lower for premium risk and 10.9% lower for reserve risk, expressed as percentages of the risk charge.

Table 7-1C – Comparison IIA applied before or after Diversification

Part C- Change in RBC UW Risk Value - Alternative Methods				
Row	Item	Premium	Reserve	Notes
1	% Diversification Credit	39%	62%	Part B row 9 / Part A row 9
2	% Risk Charge	-6.9%	-10.9%	Part B row 8 / Part A row 8
3	% Reserve/Premium	-0.8%	-1.9%	Part B row 8 - Part A row 8

Appendix 2 analyzes the details that explain why the order of operations produces this difference.

Effect of Changes in Interest Rate/Inflation Environment

Report 2 showed that there is an interaction between Line 4 risk factors and interest rates. It evaluated the indicated risk factors on a present value (PV) basis, and in that way, it produced the indicated Line 4 and IIAs that consider this interaction.

In this Report, we calibrate the diversification credit using LR and RRRs on a nominal value (NV) basis, rather than a present value (PV) basis.

On one hand,

- The Modeled Risk calculation in the MDC calibration uses the Line 4 Factors, NV factors, reflecting the changes in interest/inflation rates over the 1988-2017 (2016) time period, and
- We observe that the indicated MDCs are lower in the earlier periods when interest/inflation rates are higher, and the indicated MDCs are higher in the current periods when interest/inflation rates are lower. The indicated MDC represents experience across both periods.[66]

From that perspective, there is reason to expect that the NV calculation of MDC is reasonable.

On the other hand,

- More complex relationships might exist between MDC and interest/inflation rates, and the current analysis might not reflect those relationships. An analysis of MDC on PV value could explore that possibility.
- The PV analysis would reduce the proportion of risk from long-tail LOBs, compared to shorter-tail LOBs, which might affect the indicated MDC.

We have not done a PV analysis for this Report, and it remains a matter for future research.

Diversification Metrics

In this report:

- We calculate the indicated MDC to produce a total LOB diversification credit that is consistent with the loss experience.
- We test the extent to which the CoMaxLine% allocation of diversification credit by company is consistent with loss experience.

[66] Specifically, the inflation and interest rates in the earlier 1988-2002 time period were higher than in the more recent years, 2003-2017 (2016). Higher interest rates produce higher LRs and higher RRRs, and therefore higher indicated risk charges. The indicated MDCs adjust for that by increasing the average Line 4 Factor in Modeled Risk in the earlier periods, compared to the overall average. The MDC reflects the difference in Observed Risk by size/diversification after removing this difference in overall risk level.

We did not test alternatives to the CoMaxLine% approach, because:

- Our calibration of the indicated MDC established the appropriate total level of LOB diversification credit in the RBC Formula, which is largely independent of the diversification formula.
- Based on our review of DCWP Reports 13 and 14,[67] we conclude that:
    - The company-by-company impact of alternative formulas is not generally large.
    - The potential additional accuracy of a revision is not large compared to the effect of the overall change indicated by this report.
    - The theoretical case for making a change is not compelling, especially in light of the two points above.

Appendix 3 presents our review of the DCWP findings.

Nonetheless, a review of the dependency formula is appropriate for the future.

Calibration Safety Level

There is no explicit overall safety level target for the CAL level in the P&C RBC Formula. Nonetheless, we understand that the prevailing regulatory view is that the implicit safety level has produced satisfactory results.

Impact on Safety Level-Revised MDC

Within the overall CAL, the Line 4 premium and reserve risk factors and the MDC are calibrated to a safety level of 87.5% with a runoff time horizon. This 87.5th percentile/runoff time frame safety level for premium and reserve risk is implicit in the original calibration[68] and has been retained for reasons including the regulatory view that the premium and reserve risk components and the overall effect of the RBC Formula are satisfactory.

The indicated MDCs presented in this report are larger than the MDC in the RBC Formula. This implies that the current RBC Formula incorporates some conservatism in the underwriting risk elements, relative to the 87.5th percentile safety level. Thus, even though the Line 4 Factors are calibrated at the 87.5th percentile, the Line 4 Factors combined with the conservative MDCs produced a safety level higher than the 87.5th percentile.

Adopting the indicated MDC in the RBC Formula reduces the safety level for R4 and R5, and therefore CAL.

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[67] DCWP Report 13 - RBC LOB Diversification: Current RBC Approach vs. Correlation Matrix Approach, DCWP Report 14 - Calibration of LOB Diversification in Underwriting Risk Charges

DCWP work was based on data through December 2010.

[68] American Academy of Actuaries, Property and Casualty Risk-Based Capital Underwriting Factors and Investment Income Adjustment Factors, Pages 57-58.

Impact on Safety Level-Past Formula Changes

Since the implementation of the RBC Formula, several changes have been made that increased the implied safety level (e.g., R_{CAT} set at the 1-in-100 safety level and the addition of the operational risk charge at 3% of RBC).

There have also been changes that have decreased it (e.g., reduced fixed income risk charges for assets and reduced reinsurance credit risk charges).

Each of these changes may make the RBC Formula more accurate in assessing a particular risk. However, any significant change to any element of the RBC Formula implies a potential change in the implied safety level.

Observation

Any change in the RBC Formula implies a judgment that the resulting overall impact on the CAL safety level is appropriate, and whether a reduction (or increase) in one area requires a corresponding increase (or decrease) in another area to achieve the desired overall level.

We do not measure the safety level impact of adopting the indicated MDCs on R4, R5, or CAL, nor do we determine whether the total ACL is appropriate for regulatory purposes. That is beyond the scope of this Report.

8. SUMMARY OF FINDINGS

The scope of this Report is to examine the CoMaxLine% approach as applied in the RBC Formula. In that context, the committee findings are:

Finding 1:
Based on the above analysis, the committee believes that MDCs of 45% for premium and 65% for reserves are reasonable selections and are better supported by the data than the current 30% MDC. We refer to these as the indicated MDCs.

There are reasonable alternative MDC selections, which we discuss in Section 3 and Section 6/Sensitivity Analysis.

Finding 2:
While the linear relationship between diversification credit and CoMaxLine% is not exact, considering the alternatives, the Committee believes it is a reasonable approximation, especially for more diversified companies.

Finding 3:
We recommend further research on alternatives to the current RBC diversification approach, particularly the method we refer to as CoMaxLine%-Risk, which measures diversification by risk by LOB rather than dollars of premium/reserve.

Finding 4:
The treatment of the IIA/Diversification interaction and the effect of a fully PV analysis are matters for future research.

Finding 5:
Other areas of future research for dependency analyses that we identify in this Report are the following:

Calibration net of cats covered by R-Cat
Resolving issues in combining RBC and AS data
Within the CoMaxLine% approach, or any alternative, test square, square root, or other relationships between diversification index and diversification credit, rather than the current linear relationship.

9. Appendix 1 – Size-adjusted Indicated MDC Calculations

In Section 6, Sensitivity Analysis, Table 6-1, row 2, we present the indicated MDCs that would result if the risk factors in Line 4 varied by company-size, specifically 42% and 56% for premium and reserve risk, respectively.

This Appendix presents the derivation of those results.

Variation in Risk by Company-size

In Exhibits A1-1A and A1-1B, below, we calculate adjustments to the all-lines premium and reserve risk factors that reflect company-size.

Part 1 of Appendix 1- Exhibit A1-1A, below, is a copy of Table 5-2A, Part 1.[69] It shows the 87.5th percentile AYUL for each size and diversification cell. We refer to this as the observed risk. The values in the column "All ex A" are the observed risk values for all company-sizes larger than A (i.e., company-sizes B-E), for each diversification level.[70]

Part 2 shows the ratio of each cell to the value in the column "labeled "All ex A," in the corresponding row. For example:

- The value 2.273 in the cell with diversification 0 and size A equals 0.700/0.308. The value 2.273 means that the observed risk for cell A/0 is 2.273 times larger than the observed risk for size cells B-E.
- The value 0.910 in the cell with diversification 5 and size E equals 0.139/0.153. The value 0.910 means that the observed risk for cell E5 is 0.910 times (9% less than) the observed risk for size cells B-E.

Looking across columns, in any row, these ratios generally decline (indicating lower risk) as company-size increases. This is consistent with our expectation that the risk level decreases with increasing company-size, while holding the diversification level constant.

Part 3 shows the unweighted average observed risk in Part 2 for diversification bands 3-5[71] (down each column), for each size level, A-E.

We use these ratios to create size-adjusted all-line average Line 4 Factors.

[69] Tables 5-2A and B show the values as rounded percentages. This table shows the values as three-decimal ratios.

[70] We exclude company-size A, which consists of the data points with the smallest 20th percentile of company-size because that corresponds, approximately, to the Line 4 calibration that excludes the smallest 15th percentile of LOB-size, for the reasons we discuss in Section 5.

[71] We use diversification 3-5 because, as we discussion in Section 5, those are the diversification bands we use in the MDC calibration.

Appendix 1 – Exhibit A1-1A
Premium Risk
(Corresponding to Table 5-2A-Part 1)

Part 1 - Observed AYUL (87.5th percentile)							
Div/Size	**A**	**B**	**C**	**D**	**E**	**All**	**All ex A**
0	0.700	0.316	0.259	0.270	0.388	0.400	0.308
1	0.675	0.269	0.294	0.255	0.277	0.312	0.271
2	0.477	0.264	0.215	0.178	0.177	0.236	0.204
3	0.521	0.212	0.181	0.178	0.160	0.213	0.181
4	0.450	0.182	0.165	0.163	0.139	0.175	0.157
5	0.833	0.243	0.154	0.158	0.139	0.159	0.153
All	0.623	0.259	0.216	0.189	0.179	0.251	0.206
All ex 0	0.565	0.235	0.205	0.179	0.156	0.213	0.187

Part 2 - Observed AYUL (87.5th percentile) / All ex A							
Div/Size	**A**	**B**	**C**	**D**	**E**	**All**	**All ex A**
0	2.273	1.027	0.841	0.877	1.259	1.299	1.000
1	2.490	0.992	1.086	0.939	1.023	1.152	1.000
2	2.333	1.290	1.053	0.870	0.863	1.156	1.000
3	2.883	1.172	1.000	0.987	0.887	1.180	1.000
4	2.857	1.155	1.045	1.037	0.884	1.112	1.000
5	5.453	1.591	1.007	1.032	0.910	1.041	1.000
All	3.031	1.262	1.050	0.920	0.870	1.218	1.000
All ex 0	3.022	1.257	1.096	0.957	0.835	1.136	1.000

Part 3 - Size Adjustment for Premium Risk					
SizeBand	**A**	**B**	**C**	**D**	**E**
Div 3-5	3.731	1.306	1.017	1.019	0.893

We apply the same method to reserve risk.

Appendix 1 – Exhibit A1-1B
Reserve Risk
(Corresponding to Table 5-2B-Part 1)

Part 1 - Observed Reserve Development (87.5th percentile)							
Div/Size	A	B	C	D	E	All	All ex A
0	0.582	0.411	0.278	0.245	0.177	0.371	0.291
1	0.500	0.529	0.241	0.227	0.154	0.298	0.274
2	0.531	0.422	0.281	0.208	0.128	0.277	0.247
3	0.566	0.412	0.312	0.246	0.185	0.310	0.278
4	0.490	0.415	0.329	0.266	0.254	0.323	0.301
5	0.750	0.362	0.297	0.259	0.251	0.280	0.269
All	0.561	0.428	0.282	0.245	0.209	0.315	0.277
All ex 0	0.542	0.432	0.285	0.245	0.212	0.298	0.274

Part 2 - Observed Reserve Development (87.5th percentile) / All ex A							
Div/Size	A	B	C	D	E	All	All ex A
0	2.001	1.412	0.957	0.843	0.608	1.275	1.000
1	1.822	1.929	0.879	0.826	0.563	1.087	1.000
2	2.144	1.704	1.134	0.842	0.517	1.119	1.000
3	2.034	1.483	1.123	0.886	0.663	1.113	1.000
4	1.628	1.378	1.093	0.881	0.843	1.071	1.000
5	2.791	1.347	1.106	0.963	0.934	1.042	1.000
All	2.024	1.544	1.019	0.885	0.755	1.138	1.000
All ex 0	1.977	1.576	1.041	0.895	0.773	1.087	1.000

Part 3 - Size Adjustment for Reserve Risk					
SizeBand	A	B	C	D	E
Div 3-5	2.151	1.402	1.107	0.910	0.813

Size-Adjusted Indicated MDC

Appendix 1, Exhibit A1-2A and A1-2B, below, corresponds to Tables 5-2A and 5-2B.

- Part 1 Observed Risk and Part 4 Calculated Diversification have values equal to those in Tables 5-2A and 5-2B, Parts 1 and 4.
- Part 2 Modeled Risk values equal the Part 2 values from Tables 5-2A and 5-2B times the size adjustment factors in Exhibit A1-1A and A1-1B Part 3.[72]
- Parts 3 and 5 are calculated with the formulas shown at the bottom of those sections.

[72] More precisely, for premium risk we multiply the Line 4 risk factor by the Part 3 value and combine that with the company expense ratio to produce the adjusted modeled risk. For reserve risk we multiply the Line 4 risk factor by the Part 3 value.

Appendix 1 – Exhibit A1-2A – Premium Risk
Size-adjusted
Indicated MDC by Size/Diversification (5x6 Analysis)
(Corresponding to Table 5-2A-Parts 1-5)

Divers Band Quintiles	Observed Risk (Part 1) Size Band Quintiles (adj B-E) A	B	C	D	E	AllSize > 20%
0	70%	32%	26%	27%	39%	31%
1	67%	27%	29%	25%	28%	27%
2	48%	26%	22%	18%	18%	20%
3	52%	21%	18%	18%	16%	18%
4	45%	18%	16%	16%	14%	16%
5	83%	24%	15%	16%	14%	15%
All	62%	26%	22%	19%	18%	21%
All ex 0	57%	24%	21%	18%	16%	19%
	C3-E5 Unweighted	16.0%	Weighted	15.7%		

Divers Band Quintiles	Modeled Risk No Diversification (Part 2) Size Band Quintiles (adj B-E) A	B	C	D	E	AllSize > 20%
0%	114%	42%	36%	47%	56%	40%
100%	92%	36%	30%	33%	32%	30%
200%	78%	30%	22%	23%	21%	23%
3	73%	28%	21%	21%	20%	21%
4	80%	28%	22%	22%	20%	22%
5	82%	27%	21%	21%	20%	22%
All	97%	34%	26%	27%	25%	26%
All ex 0	81%	30%	23%	24%	21%	23%
	C3-E5 Unweighted	20.8%	Weighted	20.7%		

Divers Band Quintiles	Indicated Diversification Credit (Part 3) Size Band Quintiles (adj B-E) A	B	C	D	E	AllSize > 20%
0	39%	25%	29%	43%	31%	23%
1	27%	25%	1%	23%	12%	11%
2	38%	11%	2%	24%	14%	9%
3	28%	25%	13%	15%	20%	15%
4	44%	35%	24%	25%	29%	27%
5	-1%	11%	27%	26%	30%	29%
All	36%	23%	16%	30%	28%	22%
All ex 0	30%	22%	12%	25%	26%	20%
	C3-E5 Unweighted	23.3%	Weighted	24.2%		

(Part 3) = 1 - (Part 1)/(Part 2)

Divers Band Quintiles	Calculated Diversification Credit (Part 4) Size Band Quintiles A	B	C	D	E	AllSize > 20%
0%	0%	0%	0%	0%	0%	0%
100%	2%	2%	2%	2%	2%	2%
2	8%	8%	8%	8%	8%	8%
3	12%	12%	12%	13%	13%	13%
4	16%	16%	16%	16%	17%	16%
5	20%	21%	21%	21%	22%	21%
All	5%	7%	9%	11%	14%	10%
All ex 0	9%	10%	11%	12%	15%	12%
	C3-E5 Unweighted	16.6%	Weighted	17.2%		

(Part 4) = 1 - Diversification Credit Calculated (Current RBC)

Divers Band Quintiles	Indicated Max Diversification Credit (Part 5) Size Band Quintiles A	B	C	D	E	AllSize > 20%
0						
1	405%	404%	12%	351%	197%	178%
2	148%	42%	9%	91%	53%	35%
3	68%	59%	31%	37%	47%	35%
4	83%	65%	44%	47%	53%	50%
5	-1%	16%	39%	38%	41%	41%
All	229%	100%	56%	84%	60%	66%
All ex 0	100%	65%	34%	61%	51%	48%
	C3-E5 Unweighted	42.0%	Weighted	42.0%		
	StdDev	6.3%	StdDev	6.1%		

(Part 5) = 0.30 * (Part 3)/(Part 4)

Appendix 1 – Exhibit A1-2B – Reserve Risk
Size-adjusted
Indicated MDC by Size/Diversification (5x6 Analysis)
(Corresponding to Table 5-2B-Parts 1-5)

Divers Band Quintiles	Observed Risk (Part 1) Size Band Quintiles (adj B-E) A	B	C	D	E	AllSize > 20%
0	58%	41%	28%	25%	18%	29%
1	50%	53%	24%	23%	15%	27%
2	53%	42%	28%	21%	13%	25%
3	57%	41%	31%	25%	18%	28%
4	49%	42%	33%	27%	25%	30%
5	75%	36%	30%	26%	25%	27%
All	56%	43%	28%	25%	21%	28%
All ex 0	54%	43%	29%	25%	21%	27%
	C3-E5 Unweighted		26.7%	Weighted	26.4%	

Divers Band Quintiles	Modeled Risk No Diversification (Part 2) Size Band Quintiles (adj B-E) A	B	C	D	E	AllSize > 20%
0%	71%	50%	39%	34%	26%	40%
100%	62%	41%	32%	27%	25%	30%
200%	63%	43%	33%	29%	25%	23%
3	70%	47%	38%	33%	32%	21%
4	74%	50%	41%	35%	34%	22%
5	81%	50%	43%	35%	34%	22%
All	70%	47%	37%	32%	30%	26%
All ex 0	68%	45%	37%	32%	31%	23%
	C3-E5 Unweighted		35.9%	Weighted	35.5%	

Divers Band Quintiles	Indicated Diversification Credit (Part 3) Size Band Quintiles (adj B-E) A	B	C	D	E	AllSize > 20%
0	19%	17%	29%	27%	31%	27%
1	19%	-31%	24%	17%	39%	10%
2	16%	3%	16%	28%	49%	-10%
3	19%	12%	17%	24%	42%	-31%
4	34%	17%	19%	24%	26%	-40%
5	7%	28%	30%	25%	26%	-25%
All	20%	9%	25%	23%	31%	-5%
All ex 0	20%	5%	22%	23%	32%	-17%
	C3-E5 Unweighted		26.0%	Weighted	25.9%	

(Part 3) = 1 - (Part 1)/(Part 2)

Divers Band Quintiles	Calculated Concentration Ratio (Part 4) Size Band Quintiles A	B	C	D	E	AllSize > 20%
0%	0%	0%	0%	0%	0%	0%
100%	1%	1%	1%	1%	1%	1%
200%	5%	5%	5%	5%	5%	5%
3	10%	10%	10%	10%	10%	10%
4	14%	14%	14%	14%	14%	14%
5	18%	19%	19%	19%	20%	19%
All	4%	6%	7%	8%	11%	8%
All ex 0	8%	9%	9%	10%	12%	10%
	C3-E5 Unweighted		14.5%	Weighted	15.0%	

(Part 4) = 1 - Diversification Credit Calculated (Current RBC)

Divers Band Quintiles	Indicated Max Diversification Credit (Part 5) Size Band Quintiles A	B	C	D	E	AllSize > 20%
0						
1	452%	-776%	598%	434%	919%	248%
2	98%	17%	100%	174%	307%	-62%
3	57%	36%	53%	75%	127%	-97%
4	72%	35%	40%	50%	53%	-83%
5	11%	45%	48%	39%	40%	-39%
All	151%	45%	108%	82%	86%	-19%
All ex 0	74%	18%	74%	67%	78%	-52%
	C3-E5 Unweighted		58.5%	Weighted	56.2%	
	StdDev		26.4%	StdDev	25.2%	

(Part 5) = 0.30 * (Part 3)/(Part 4)

Appendix 1- Exhibit A1-3, below, shows the size-adjusted indicated MDCs from Exhibit A1-2A and 2B, and compares them to the unadjusted results in Table 5-2A and 5-2B.

Appendix 1 – Exhibit A1-3
Indicated MDCs

Size Adjustment = NO	Premium	Reserves
C3-E5 Wtd Average	45.9%	66.3%
C3-E5 Standard Deviation	12.9%	37.5%
Size Adjustment = YES	**Premium**	**Reserves**
C3-E5 Wtd Average	42.0%	56.2%
C3-E5 Standard Deviation	6.1%	25.2%

The size-adjustment reduces the indicated MDCs, and it also decreases variability among the C3—E5 MDC indications, as measured by the standard deviation. It also narrows the difference between the premium risk indicated MDC and the reserve risk indicated MDC.

The size-adjusted indications still suggest MDCs larger than the current 30%.

Regression Analysis

In Appendix 1, Exhibits A1-4 and A1-5 below, we repeat the regression analysis from Section 5, applied to size-adjusted risk data in Exhibit A1-2A and 2B.

Appendix 1 – Exhibit A1-4
Large Diversified Companies (with Size-Adjusted Risk Factors)
Graphical Analysis of CoMaxLine% Element of Diversification Formula
5 x 6 Analysis; 9 Large Diversified Company Data Points
(Corresponding to Table 5-4, no size adjustment)

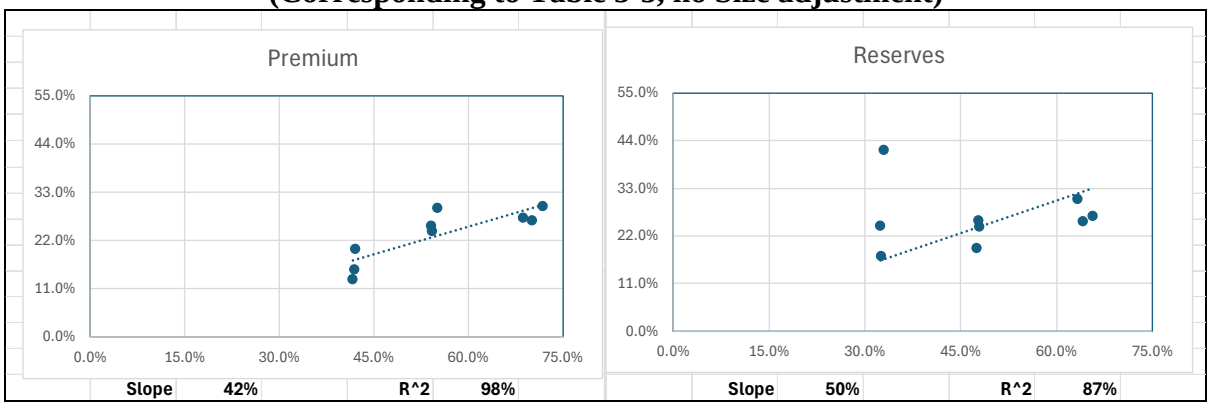
		Premium			Reserves		
		(1)	(2)	(3)	(4)	(5)	(6)
Size Band	Div Band	Average Div Level	Indicated Divers	Fitted Divers	Average Div Level	Indicated Divers	Fitted Divers
C	3	41.6%	13.0%	17.5%	32.5%	17.2%	16.4%
D	3	41.8%	15.4%	17.6%	32.4%	24.2%	16.3%
E	3	42.0%	19.9%	17.6%	32.9%	41.8%	16.5%
C	4	54.2%	23.9%	22.8%	47.5%	19.1%	23.9%
D	4	54.1%	25.3%	22.7%	47.9%	23.9%	24.1%
E	4	55.1%	29.4%	23.1%	47.7%	25.5%	24.0%
C	5	68.7%	27.1%	28.9%	63.2%	30.5%	31.8%
D	5	70.1%	26.4%	29.4%	64.1%	25.3%	32.2%
E	5	71.7%	29.7%	30.1%	65.7%	26.5%	26.5%

The regression data in Exhibit A1-4 is as follows:

- Columns 1 & 4: Average diversification index for premium and reserve risk, respectively (from Exhibits A1-2A and A1-2B, Part 4 divided by 30%).

- Columns 2 & 5: Indicated diversification credit (from Exhibit A1-2A/B, Part 3).
- Columns 3 & 6: Fitted diversification credit, derived from the regression through the origin applied to the prior columns.

Appendix 1 – Exhibit A1-5
Large Diversified Companies (with Size Adjustment)
Graphical Analysis of CoMaxLine% Element of Diversification Formula
5 x 6 Analysis; 9 Large Diversified Company Data Points
(Corresponding to Table 5-5, no Size adjustment)



In Appendix 1 – Exhibit A1-5

- The X-axis represents the average diversification index (Appendix 1-Exhibit A1-4 columns 1 and 4).
- The Y-axis represents the indicated diversification credit (Appendix 1-Exhibit A1-4 columns 2 and 5)
- The slope of the fitted line is 42% for premium risk and 50% for reserve risk.

The regression "R-squared" values[73] are:

- 98% for premium and
- 87% for reserves.
- These indicate a 'better fit' than with the data before size-adjustment.

The slopes serve as alternate estimates of the size-adjusted indicted MDCs shown in Exhibit A1-3, above.

- The premium slope, 42%, is the same as the slope from the C3-E5 cell average, 42%.
- The reserve slope of 50% is not as close to the C3-E5 cell average, 56%.

[73]See footnote 51.

Appendix 2 – Diversification and IIAs

In Section 7, we showed that the risk value depends on the order in which we apply diversification credit and IIA. In this Appendix, we explain how the operation of the IIA produces that effect.

The IIA can be viewed in three parts:

- Part 1 - The investment income credit on the premium less expense[74] /initial carried reserves,
- Part 2 - The investment income credit on the premium/reserve risk charge, and
- Part 3 - The reduction in investment income credit related to the diversification credit.

Part 1 is the investment income on loss reserves and on the expense portion of the premium, before considering risk charges. Parts 2 and 3 are the elements of investment income on the risk charge.

In the current RBC Formula, the investment income adjustment on the diversification credit, Part 3, is, in effect, the average of the investment income credits on parts 1 and 2, as follows:

Assume, for example, for reserves, that the IIA is 0.872 (a 12.8% discount) and the risk charge is 0.385. Then, the first two parts of the investment income credit would be:

- Part 1 – 12.8% of reserves (or premium less expense), and
- Part 2 – 12.8% of the risk charge, 0.385 times reserves 4.9%.

Therefore,

- Part 1 and Part 2 investment income credit combined is 12.8% of the total reserves plus 12.8% of the reserve risk charge.
- That equals 46.0% of the risk charge before IIA (12.8% + 4.9%)/0.385.
- The total investment income credit, 46% of risk charge, is ‘large’ compared to 12.8% because Part 1 of the investment income credit is large compared to the risk charge.

[74] The loss portion of premium, i.e., premium less expenses

Thus, the diversification credit is applied to the risk charge after the 46% reduction for the investment income credit, and therefore, the diversification credit is implicitly reduced by 46%.

The alternative treatment is to reduce the diversification credit by the marginal investment income attributable to the diversification credit alone, i.e., 12.8%, rather than 46%. Using the 12.8% investment income adjustment increases the diversification credit and reduces the risk charge for multi-line companies.

The section below provides a detailed comparison of the alternatives.

Exhibit A2-1/Part A – Current Method – Apply IIA before Diversification Credit

Exhibit A2-1 uses sample values for the Line 4 Factor, the IIA Factor, and the diversification credit to show the investment income treatment under the current and alternative calculations in detail.

Part A, rows 1-4, shows the values for RBC Formula inputs.

Rows 5-7 use the current RBC Formula to calculate risk charges:
(a) Row 5: before IIA and Diversification,
(b) Row 6: after IIA, before diversification, and then
(c) Row 7: after IIA and diversification.

Row 8 displays the diversification credit as a percentage of premium/reserve, calculated as row 6 minus row 7.

Appendix 2 – Exhibit A2-1 – Part A – Current Method
(Values are % of Premium or Reserves)

Part A -Diversification - Current Method				
Row	Item	Premium	Reserve	Notes
1	Line 4	0.934	0.385	Industry all-line-weighted average
2	IIA	0.927	0.872	Industry all-line-weighted average
3	Expense Ratio	0.270	NA	Industry all-line-weighted average
4	Diversification Credit	0.150	0.150	Industry all-line weighted average
5	Risk Charge-Before IIA Before Div	0.204	0.385	Note 1
6	Risk Charge-After IIA Before Div	0.136	0.208	Note 2
7	Risk Charge-After IIA and After Div	0.115	0.177	(6)*(1.0-(4))
8	Div Credit-% Rsv/Prem	0.020	0.031	(6)-(7)

Note 1: Premium Risk row (5)=(1)+(3) -1.0; Reserve Risk: (5)=row 1.

Note 2: Premium Risk row (5)=(1)*(2)+(3)-1.0; Reserve Risk: (6)=(1.0+(1))*(2)-1.0.

We display rounded values, but we calculate with unrounded values. Therefore, calculations using the rounded values shown may not exactly reproduce the displayed rounded results.

This applies to all Tables and Exhibits in this Report.

Exhibit A2-1/Part B – Current Method – Apply IIA Before Diversification Credit

In Part B, we rearrange Part A to explicitly show the interaction between the IIA and diversification credit.

Appendix 2 – Exhibit A2-1 – Part B – Current Method-Details of IIA
(Values are % of Premium or Reserves)

Part B -Diversification - Re-Arrange -Current Method				
Row	**Item**	**Premium**	**Reserve**	**Notes**
9	Risk Charge-Before IIA or Div	0.204	0.385	(5)
10	IIA Credit Before Div	0.068	0.177	(5)-(6)
11	Div credit before IIA	0.031	0.058	(4)*(9)
12	IIA credit on Div	0.010	0.027	**(4)*(10)**
13	Div credit after IIA	0.020	0.031	(11)-(12)
14	Risk charge-after IIA and Div credits	0.115	0.177	(9)-(10)-(13)

Relative to $100 of reserves, this shows:

Row 9-Reserve risk before IIA or diversification credit is $38.50, row 5.

Row 10-Investment income credit is $17.70 ($38.50 – $20.70, row 5 – row 6).

Row 11-Diversification credit before investment income is $5.80 (15% of $38.50).

Row 12-Investment income credit on diversification credit is 2.70 (15% of 17.70).

$17.70 is based on Part 1 and Part 2 investment income, so this calculation is equivalent to applying the average investment income credit to the diversification portion of the risk charge.

Row 13-Diversification credit net of investment income is $3.10 ($5.80 – $2.70).

Row 14-Risk Charge after IIA and diversification credit is **$17.70**
($38.50 – $17.70 – $3.10).

Exhibit A2-1/Part C – Alternative Method – Apply Diversification Credit Before IIA

Part C shows the alternative treatment of investment income offset:

Appendix 2 – Exhibit A2-1 – Part C – Alternative Method
(Values are % of Premium or Reserves)

Part C -Diversification - Alternative Method				
Row	**Item**	**Premium**	**Reserve**	**Notes**
15	Risk Charge-Before IIA or Div	0.204	0.385	(5) or (9)
16	IIA Credit Before Div	0.068	0.177	(10) or (5)-(6)
17	Div credit before IIA	0.031	0.058	(11) or (4)*(9)
18	IIA credit on Div	0.002	0.007	**(1-(2)*(17)**
19	Div credit after IIA	0.028	0.050	(17)-(18)
20	Risk charge-after IIA and Div credits	0.107	0.157	(15)-(16)-(19)

Relative to $100 of reserves, this shows:

Row 15-Reserve risk before IIA or diversification credit is $38.50, row 1.
Row 16-Investment income credit is $17.70 (38.50 – 20.70, row 5 – row 6).
Row 17-Diversification credit before investment income is $5.80 (15% of 38.5).
Row 18-Investment income credit on diversification credit is $0.70 (0.128 * $5.8, where 0.128 =1.0 -0.872).
Row 19-Diversification credit net of investment income is $5.10 (5.80 – 0.70)
(5.00 shown on row 19 is calculated from values before rounding.)
Row 20-Risk Charge after IIA and diversification credit is **$15.70** (38.50 – 17.70 – $5.10).

The difference between the methods is presented in the two bold lines, rows 12 and 18.

Row 12, the current method: The diversification credit is reduced by the average investment income effect on the risk charge, yielding an investment income credit of **$2.70**.

Row 18, the alternative method: The diversification credit is reduced by the marginal investment income loss on the diversification credit, which is **$0.70** = (1.0 - 0.872) * $5.80.

- The **$2.00** difference per $100 reserve, $2.70 - $0.70, is a reduction of over 10% of the $17.70 risk charge under the current method.

Exhibit A2-1/Part D – Comparison of the Effect of the Alternative Method

Part D of Exhibit A2-1, below, shows the difference in the methods as percentages of the diversification credit, the risk charge, and the reserve/premium volume.

- Row 21 shows that diversification credit is much larger with the alternative method, 39% larger for premium and 62% larger for reserves.
- Row 22 shows that the effect of the larger diversification credits on the risk charges is a decrease of 6.9% for premium risk and 10.9% for reserve risk.

- Row 23 expresses those effects as a percentage of reserves or premium, a decrease of 0.8% of premium and 1.9% for reserves.

Appendix 2 – Exhibit A2-1 – Part D – Effect of Alternative Method

Part D- Change in RBC UW Risk Value - Alternative Methods				
Row	Item	Premium	Reserve	Notes
21	% Diversification Credit	39%	62%	(19)/(13)
22	% Risk Charge	-6.9%	-10.9%	(20)/(14)-1.0
23	% Reserve/Premium	-0.8%	-1.9%	(20)-(14)

Effect of Alternative Method – Varying Line 4, IIA, and Diversification Credits

Part D, above, illustrates the impact on a specific set of risk factors and diversification levels. The effect of the alternative method depends on the level of diversification, the IIA Factor, and the Line 4 Factor. Exhibits A2-2A and 2B below show further examples for premium risk and reserve risk, respectively.

1. Vary Diversification Credit –with Fixed Line 4 and IIA-Reserve Risk

The first section in Exhibits A2-2A and A2-2B, "Div Credit," illustrates the extent to which the alternative method reduces the risk charge at different levels of diversification credit, for fixed Line 4 and IIA Factors.

The example uses typical Line 4 and IIA Factors, e.g., 0.385 and 0.872 for reserves. We observe that:

- For reserve risk, the impact on the diversification is an increase of 62% regardless of the diversification level.
- Even though the impact on the diversification credit is constant as a percentage of the diversification credit, the impact increases with diversification as a percentage of risk or reserve level. At a high level of diversification, e.g., 25%, the risk charge decreases by 21% with the alternative method.

2. Vary Line 4 Factor - with Fixed IIA and Diversification Credit-Reserve Risk

The "Line 4" section of Exhibit A2-2A illustrates the extent to which the risk charge changes with varied Line 4 Factors and constant IIA and diversification credit:

- The impact is constant as a percentage of premium/reserves, regardless of the Line 4 Factor, 1.1% in this example, for premium.
- The impact is lower with higher Line 4 Factors as a percentage of diversification credit and risk charge.

3. Vary IIA - with Fixed Line 4 and Diversification Credit-Reserve Risk

The "IIA" section of the Exhibit shows that lower IIAs, equivalent to higher investment income, means that the alternative method will have a greater impact, given fixed L4 and diversification credit.

Appendix 2 – Exhibit A2-2A – Premium Risk Impact

Test Variable	Inputs			Impact		
	Line 4	IIA	Div. Credit	% Div Credit	% Risk	% Premium
Div Credit	0.934	0.927	0%	NA	0%	0.0%
	0.934	0.927	5%	39%	-2%	-0.3%
	0.934	0.927	10%	39%	-4%	-0.5%
	0.934	0.927	15%	39%	-7%	-0.8%
	0.934	0.927	25%	39%	-13%	-1.3%
Line 4	0.900	0.900	0.15	91%	-16%	-1.1%
	0.950	0.900	0.15	58%	-10%	-1.1%
	1.000	0.900	0.15	43%	-8%	-1.1%
	1.100	0.900	0.15	28%	-5%	-1.1%
	1.200	0.900	0.15	21%	-4%	-1.1%
IIA	0.934	0.975	0.15	10%	-2%	-0.3%
	0.934	0.872	0.15	111%	-20%	-1.4%

Exhibit A2-2B shows similar examples for reserve risk.

Appendix 2 – Exhibit A2-2B – Reserve Risk Impact

Test Variable	Inputs			Impact		
	Line 4	IIA	Div. Credit	% Div Credit	% Risk	% Reserve
Div Credit	0.385	0.872	0%	NA	0%	0.0%
	0.385	0.872	5%	62%	-3%	-0.6%
	0.385	0.872	10%	62%	-7%	-1.3%
	0.385	0.872	15%	62%	-11%	-1.9%
	0.385	0.872	25%	62%	-21%	-3.2%
Line 4	0.385	0.800	0.15	185%	-33%	-3.0%
	0.400	0.800	0.15	167%	-29%	-3.0%
	0.500	0.800	0.15	100%	-18%	-3.0%
	0.700	0.800	0.15	56%	-10%	-3.0%
	0.900	0.800	0.15	38%	-7%	-3.0%
IIA	0.385	0.950	0.15	16%	-3%	-0.7%
	0.385	0.800	0.15	185%	-33%	-3.0%

Appendix 3 – Alternatives to the CoMaxLine% Approach

In this report, we evaluate the MDC based on the existing CoMaxLine% approach. As part of that work, we reviewed the two 2019 Casualty Actuarial Society (CAS) Dependency and Calibration Working Party (DCWP) reports on alternative diversification formulas.[75]

This Appendix presents our review of the DCWP work.

DCWP evaluated three questions:

1. Meaningful differences – To what extent do different formulas impact the indicated diversification credit by company?

2. Improved accuracy – To what extent is the CoMaxLine% approach a better or worse predictor of indicated diversification credit effects than other formulas?

3. Theoretical considerations – What are the theoretical considerations in selecting among the diversification formulas?

In the next four subsections, we identify the alternative formulas that DCWP considered and discuss DCWP's analysis of those three questions.

Alternative Formulas

Looking at the treatment of diversification in regulatory capital formulas outside the RBC framework, the UK Individual Capital Adequacy Standard[76] (UK ICAS) can be thought of as the simplest. The UK ICAS required capital is called the Enhanced Capital Requirement (ECR).[77] Under the ECR, there is no premium or reserve risk diversification adjustment. Instead, LOB risk factors were selected to represent the LOB risk when combined with a typical LOB distribution.[78]

The CoMaxLine% approach can be viewed as one step more complex than the UK ICAS in that it recognizes different levels of diversification.

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[75]Report 13 - RBC LOB Diversification: Current RBC Approach vs. Correlation Matrix Approach, https://www.casact.org/sites/default/files/2021-02/01_cas-working-party_dependency.pdf, CAS E-Forum Winter 2019

Report 14 - Calibration of LOB Diversification in Underwriting Risk Charges, https://www.casact.org/pubs/forum/19spforum/01_DCWP_Rpt14.pdf, CAS E-Forum Spring 2019

DCWP work was based on data through December 2010.

There were no company-size adjustments in the DCWP work.

[76] Implemented in the UK in the early 2000's before Solvency II.

[77] "Enhanced" because it increase the capital required compared to the EU "Solvency I" regime.

[78] ECR is discussed in https://www.casact.org/sites/default/files/presentation/affiliates_cae_1205_indiv-capital-assessments.pdf, and

https://www.abi.org.uk/globalassets/sitecore/files/documents/consultation-papers/2003/11/cp190.pdf, and

Models, Assessment and Regulation, Arne Sandström, 2006, Taylor & Francis Group, LLC, p 161-164, (no active link)

Correlation Factor Method

Individual company capital models (called 'internal models' in Solvency II) often combine risk charges by LOB using correlation.[79] factors between each pair of LOBs. The Solvency II Standard Formula[80] uses this pairwise Correlation Factor approach.[81]

The Correlation Factor approach, if applied to the RBC Formula, would require 171 parameters, as there are 19 LOBs. By contrast, the CoMaxLine% approach in RBC is simpler--perhaps overly so--and perhaps somewhat ad hoc.

CoMaxLine%-Risk Method

One difference between the CoMaxLine% approach and the Correlation Factor approach is that the degree of diversification in the Correlation Factor approach is based on risk by LOB. In contrast, the degree of diversification in the CoMaxLine% approach is based on volume (premium or reserve amount) by LOB.

Therefore, another alternative to the CoMaxLine% approach is the CoMaxLine%-Risk approach, which applies the CoMaxLine% framework to LOB risk rather than LOB volume, when calculating the LCF and PCF for a company.[82] For clarity, as needed, we refer to the current implementation as CoMaxLine%-Volume and the alternative as CoMaxLine%-Risk.

HHI Method

Finally, the Herfindahl-Hirschman Index (HHI), widely used by economists to measure concentration, considers the relative proportions of all LOBs—not just the largest.[83] HHI is more

[79] We use the term correlation factor approach to describe a factor method or copula method for computing total risk by combining several individual risks. In using the term, we do not intend to imply that the assumptions related to linear correlation are appropriate.

[80] The "Standard Formula" in Solvency II regime is analogous to RBC in that it is a formula that applies to all companies.

[81] Solvency II uses a CoMaxLine% approach to reflect geographic diversification.
DCWP Report 3, CAS E-Forum 2012. "Solvency II Standard Formula and NAIC Risk-Based Capital (RBC)"
https://www.casact.org/sites/default/files/database/forum_12fforumpt2_rbc-dcwprpt3.pdf

[82] For this purpose, LOB reserve risk equals reserve value times reserve risk factor. LOB premium risk equals premium value times premium risk factor plus expenses minus 100%. The PCF and LCF are calculated using LOB-risk rather than LOB-volume. For premium risk, implementation of this method requires expense information by LOB.

[83] HHI equals the sum of the squares of the LOB shares of total. For example, if there is only one LOB, HHI is 1.0, as is the case for the CoMaxLine%. 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. With two lines split 50% and 50% HHI and the CoMaxLine% are both 0.5.

complex than the CoMaxLine% because it reflects diversification across the 2nd, 3rd, 4th, etc., largest LOBs.[84]

Alternatives Considered by DCWP

Thus, the DCWP Reports considered the following alternatives to the CoMaxLine%-Volume approach:

- the Correlation Factor approach,
- the CoMaxLine%-Risk approach, and
- the HHI approaches: HHI-Volume and HHI-Risk.

Meaningful Differences?

For each company filing a 2010 Annual Statement, DCWP calculated the all-lines premium and reserve risk values, using the 2010 RBC Formula, for each company and for each of the five diversification approaches.[85] From these, DCWP computed the combined RBC UW Risk Value for each company.[86]

In the following discussion, we categorize changes in UW Risk Values as:

- Small (<5%)
- Other (≥5% and ≤ 10%)
- Moderate (10-25%)
- Large (>25%)

In comparing any two methods, we select the parameters so that the industry total diversification is the same for both methods.[87]

In our discussion, we focus on the differences we call Small, Moderate and Large.

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[84] The HHI is sometimes applied to only the n-th largest segments, e.g., the degree of diversification among the top ten LOBs. The HHI index applied to the single largest segment would be very similar to the CoMaxLine%. HHI can be written as p_1^2+p_2^2+p_3^2…+p_n^2. The truncated HHI limited to one element would be p_1^2. CoMaxLine% is p_1. HHI is always less than or equal to CoMaxLine%.

While HHI can CoMaxLine% may distribute the diversification credit differently among companies, the total diversification credit depends on MDC-HHI and MDC-CoMaxLine%. Those can be selected to achieve the same total diversification credit.

[85] DCWP Report 13 Appendix 1 describes how DCWP approximated the RBC UW Risk Value using public data.

[86] The RBC UW Risk Value for this purpose equals the square root of (a) the reserve risk value squared plus (b) the premium risk value squared. The reserve risk does not include the portion of reinsurance credit risk that is included in R4.

[87] Using the same total diversification for all methods is appropriate because the indicated total diversification is the ratio of modeled risk value before diversification compared to observed risk value. Those two are the same regardless of the diversification model, to the extent that different methods produce similar size/diversification bands, as the DCWP works showed in plausible. This is the indicated diversification we show in Box 3 of Tables 5-2A and B of this Report.

CoMaxLine% versus Correlation Factor

Applying the correlation approach requires a set of pairwise correlation factors. Calibrating those factors based on experience is a major undertaking, perhaps beyond the limits of available data.

In 2010, Solvency II Standard Formula addressed this problem in calibrating Correlation Factors as follows:[88]

- There were 12 LOBs and, therefore, 66 correlation factors.
- Each of the 66 correlation factors was selected to be either 0.25 or 0.50, based on expert judgment on whether each pair was more or less correlated.

The objective of DCWP work was to compare the CoMaxLine% to the Correlation Factor approach, as applied in a standard formula such as RBC. Therefore, regardless of the limitations of the Solvency II correlation factor calibration, DCWP followed that approach and constructed a set of pairwise correlation factors,[89] selecting values of 25% or 50% for most of the 171 LOB-pairs.

Appendix 3-Exhibit A3-1, below, shows the difference in diversification credit and UW RBC Values identified by DCWP.[90] We discuss the main differences below.

% Change in Diversification Credit (A. Div Credit Impact)

- There are large changes in diversification credit for 48% of companies, but those are concentrated in the least diversified bands.[91] For example, 81% of companies in the least diversified 20% showed large changes, but only 6% of the most diversified 20% did.

% Change in RBC UW Risk Value (B. RBC UW Risk Impact)

- Since companies receiving the large changes in diversification credit had low diversification credit levels, the overall effect on RBC UW Risk Value is small.
    - No companies experienced large changes in RBC UW Risk Value.
    - Only 10% experienced moderate changes—mostly companies in the 40th to 80th percentile diversification bands.

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[88] The Solvency II approach to selecting is described in Groupe Consultatif Actuariel Europeen, Diversification, Technical paper, 31 October 2005, pg. 11, and shown in "Advice for Band 2 Implementing Measures on Solvency II: SCR Standard Formula Article 111(d) Correlations," (former Consultation Paper 74), January 2010, pp 39-44, pg. 26.

[89] DCWP modified select pairwise correlations for LOBS possibly highly correlated: 100% between claims-made and occurrence medical malpractice and between general liability, special liability, and products liability; and 75% between special property and homeowners, between private passenger automobile liability and automobile physical damage and between commercial automobile liability and automobile physical damage.

See DCWP Report 13, Appendix 1 for further details on the construction of the DCWP Correlation Matrix.

[90] In comparing CoMaxLine%-Volume to the Correlation Factor method, DCWP used a CoMaxLine%-Volume MDC of 39.1% to produce the same total diversification credit as produced by the selected correlation factors.

[91] The fact that larger differences arise for companies with low diversification is important.

For example, if the diversification credit is 1% of risk, and if the differences between the two methods are 100%, the impact on risk is only 1%.

On the other hand, if the diversification credit is 10% of risk, and if the difference between the two methods is 100% the impact on risk is 10%, 10 times larger.

- Only 3% of the most diversified 20% had changes in the moderate category.
- Across all companies, 69% had changes below 5%.

Appendix 3 – Exhibit A3-1
CoMaxLine%-Volume versus Correlation
% of Multi-Line Companies with Large, Moderate, or Small change in Diversification Credit or UW Risk RBC Value

% Change		A. Div Credit Impact				B. RBC UW Risk Impact				
		All Div band	Least Div 0-20%	Most Div 80-100%		All Div band	Least Div 0-20%	Div 20%-40%	Div 40%-80%	Most Div 80-100%
>25%	Large	48%	81%	6%		0%	0%	0%	0%	0%
>10%	Moderate	71%	90%	28%		10%	2%	6%	20%	3%
<5%	Small	14%	3%	34%		69%	96%	59%	57%	78%

Yellow highlight on the values noted in the discussion above.

CoMaxLine%-Risk versus Correlation Factor[92]

One of the differences between CoMaxLine%-volume and Correlation is the use of premium by LOB versus risk by LOB. To test the extent to which that difference affected the comparison of CoMaxLine% to correlation, DCWP repeated the analysis for CoMaxLine%-Risk versus the Correlation Factor method. Appendix 3-Exhibit A3-2, below, shows the results.

The values in Exhibit A3-2 are lower than the corresponding values in Exhibit A3-1, indicating the CoMaxLine%-Risk is a step "towards" the Correlation Factor method.

Appendix 3 – Exhibit A3-2
CoMaxLine%-Risk versus Correlation
% of Multi-Line Companies with Large, Moderate, or Small change in Diversification Credit or UW Risk RBC Value

% Change		A. Div Credit Impact				B. RBC UW Risk Impact				
		All Div band	Least Div 0-20%	Most Div 80-100%		All Div band	Least Div 0-20%	Div 20%-40%	Div 40%-80%	Most Div 80-100%
>25%	Large	42%	74%	2%		0%	0%	0%	1%	0%
>10%	Moderate	65%	84%	21%		7%	0%	4%	15%	2%
<5%	Small	21%	4%	51%		76%	98%	67%	65%	84%

Yellow highlight on the values noted in the discussion above.

CoMaxLine%-Volume versus HHI-Volume[93]

DCWP found only small differences in RBC UW Risk Value between CoMaxLine%-Volume and HHI-Volume. For more than 97% of companies, the effect is less than 5%. The effect is below 10% for all companies.

[92] In comparing CoMaxLine%-Risk to correlation factor, DCWP used a CoMaxLine%-Risk MDC of 44.4% to produce the same total diversification credit as produced by the selected correlation factors.

[93] In comparing the CoMaxLine% approach to the HHI approach, DCWP used a CoMaxLine% MDC of 37.7% to produce the same total diversification credit as the HHI approach with MDC of 30%.

Accuracy

Subject to random variation, a perfect diversification model would result in a uniform indicated total diversification credit,[94] across the 9 cells (C3-E5) in Table 5-3.[95]

To measure accuracy, DCWP calculated the standard deviation and the absolute difference ("absolute error") in MDC values across the 9 cells, around the average for those 9 cells, for each of four methods. Appendix 3-Exhibit A3-2, below, shows these absolute error results.

For premium risk, CoMaxLine%-Risk has the lowest error. For reserve risk, the Correlation Factor approach has the lowest error. The differences in error measures between the "best" and worst" methods are as follows:

- 0.7% of premium between the best and worst approaches for premium risk,
  (0.9% CoMaxLine%-Risk best versus 1.6% Correlation Factor worst)
- 1.0% of reserves between the best and worst approaches for reserve risk.
  (1.9% for Correlation Factor, the best, versus 2.9% for CoMaxLine%-Volume, the worst)

Appendix 3 – Exhibit A3-3[96]
Absolute Error as a Percentage of Reserves or Premium (C3-E5)

Dependency Method	Premium	Reserves
CoMaxLine%-Volume	1.1%	2.9%
Correlation	1.6%	1.9%
HHI-volume	1.1%	2.1%
CoMaxLine%-Risk	0.9%	2.3%

Yellow highlight for the smallest absolute error among these methods.

These differences are approximately 5% of premium and reserve risk,[97] which is not large considering that:

- The errors represent a reallocation of the overall diversification credit rather than a change in the overall diversification level; and
- The effect is smaller than the impact of adopting the indicated MDCs, which would reduce premium risk values by 10% and reserve risk values by 20%.

Theoretical Considerations – Correlation Factor Approach

The Correlation Factor approach is commonly applied in individual company economic capital models. However, the underlying assumptions do not translate well to standard formulas such as the RBC Formula, as we explain below.

[94] Represented as a constant indicated MDC for CoMaxLine% approaches. Represented as a constant indicated change in the average level in the Correlation Factor approach.

[95] Table 5-3 is a copy of Part 5 of Tables A5-2A and A5-2B.

[96] DCWP Report 14, Table 4-2. Highlight added for emphasis.

[97] Average indicated risk charges, after IIA, before diversification and before growth risk or loss-sensitive contracts is 13.5% for premium and 20.2% for reserves (from Report 2, Table 1-1).

Individual Company Capital Model Calibration: Grounded in Risk Theory

In an individual company capital model (ICCM), each LOB has a company-specific risk distribution, reflecting its underwriting, claims, reinsurance, and other practices. To produce the all-lines risk distribution, these company-specific LOB risk distributions are aggregated using empirically-derived or expert judgment-based correlations.

RBC Calibration: Grounded in Risk Classification

Unlike the ICCM, the RBC Formula is calibrated from, and applies to, a heterogeneous population of insurers. The ICCM risk correlation assumptions do not apply.

Variation in Risk within LOB

Consider Company 1A (writing LOB A), Company 1B (writing LOB B), and Company 2 (writing LOBs A and B). Company 2 is more diversified than either Company 1A or Company 1B. Risk theory suggests that the risk charge for Company 2 should be lower than the sum of the risk charges for Company 1A plus Company 1B, depending on the degree of correlation between the LOBs.

However, that expectation assumes that the risk distributions for LOBs A and B in Companies 1A and 1B are the same as the risk distributions for LOBs A and B in Company 2, respectively.

That assumption is not routinely valid.

Variation in Risk within LOB by Type of Company

Specifically, DCWP[98] examined premium risk distributions by type of company and found variation in risk distributions for any given LOB by Type of Company.[99] For example:

- Personal Lines specialists[100] had "lower" risk[101] for PPA or HO than did more diversified insurers writing the same LOBs.

  Therefore, an insurer writing multiple LOBs may have a diversification benefit, but that benefit may be offset by the higher LOB risks (for the same LOBs) for the non-specialized (diversified) insurer compared to the "specialist."[102]

[98] Report 8 - Risk-Based Capital (RBC) Premium Risk Charges—Differences in Premium Risk Charge by Type of Company.

[99] Type of Company is defined in footnote 12.

[100] A company is a Personal Lines specialist if more than 50% of written premium is in the HO, PPA and Auto Physical Damage LOBs.

[101] We use the phrase 'lower/higher risk to mean that the 87.5th percentile LR or RRR is lower/higher for one distribution compared to another. (Note: Note that higher or lower risk does not mean higher or lower profitability.)

[102] The higher risk distribution for companies writing multiple LOBs can have various causes. These possible causes include: (a) a benefit from specialization; (b) 'specialists' write a different type of business within a single LOBs, e.g., personal use automobiles in a specialist Personal Lines writing and vehicles used for business in a multiline insurer; and (c) possible higher policy limits and higher reinsurance retention in a diversified insurer than in a specialist insurer.

- Reinsurers often have diversified portfolios. This includes the proportional business that is reported in the LOBs based on the underlying ceded business and the non-proportional business reported in LOBs N, O, or P.[103]

  However, the reinsurer's proportional business is 'riskier' than 'average' business in those LOBs. Hence, some of the diversification benefit is offset by the higher-than-average risk level of that additional business.

Thus, the effect of 'risk theory' diversification, while real, can be offset by the higher LOB-specific risk levels of that additional business.

Variation in Risk within LOB – A general feature of UW Risk

These are two high-level examples that can be identified from Annual Statement data. The issue is deeper, in that within each of the publicly reported LOBs, there are many UW sub-segments. A company that appears "diversified" between LOBs may be diversified into sub-segments that have higher or lower than average risk. Thus, companies that look 'diversified' may or may not warrant a credit for that diversification, depending on the areas of focus within their LOBs.

Risk Classification Provides a Better Conceptual Framework

We explained above that, given the risk distribution for average LOB A business and the risk distribution for average LOB B business, we cannot necessarily use a correlation approach to calculate the risk distribution for a company writing LOBs A and B.

Therefore, framing the analysis as a risk theory question is problematic. As an alternative, we frame the analysis in the context of risk classification and manual ratemaking.

Specifically, in the risk classification framework, calibrating dependency means measuring the extent to which companies writing more LOBs[104] have different indicated risk charges than companies writing fewer LOBs, after considering the risk by LOB (Line 4 Factors) and other factors considered in the RBC Formula.

In this Report, diversification calibration means:

- The total credit for diversification is empirically measured using the methods we show in Tables 5-2A and 5-2B. This measurement is analogous to calculating the statewide indicated rate levels in manual ratemaking.
- Diversification is a "risk characteristic" that can be used to classify companies by diversification level and then allocate diversification credits across companies using approaches such as CoMaxLine%, CoMaxLine%-Risk, and Correlation Factor. This is analogous to setting territorial boundaries and rate differentials.
- Not all risk characteristics are used in a particular risk classification system.

[103] In Schedule P, reinsurers are expected to allocate premiums, losses, and reserves for proportional business to LOBs based on the underlying LOB ceded by the primary insurer, LOBs other than N, O or P. LOBs N, O and P are used if the business cannot be allocated that way, i.e., for non-proportional business.

[104] More precisely, we measure diversification using CoMaxLine%, but that correlates to the number of LOBs written.

  - The RBC Formula does not consider risk characteristics like company-size, Type of Company, or variations in LOB sub-segments of the Schedule P LOBs that are used in the RBC Formula.
  - Instead, the calibration considers aggregates across the risk characteristics not included in the risk classification system, i.e., the RBC Formula.
- The Formula is intended to be reasonable enough overall, but will not be "exact" for any particular insurer.

Data Adequacy and Proportionality Considerations

Finally, as a practical matter, there will not be enough data for a data-driven calibration of the 87.5th percentile level for every one of the 171 correlation factors (for 19 LOBs), separately for premium risk and reserve risk.

Moreover, 171 parameters is a disproportionate number of parameters compared to the number of parameters used for other aspects of the RBC Formula.

DCWP Conclusions

Based on the DCWP analysis of the impact of alternative formulas, the relative accuracy of the formulas, and the theoretical considerations, DCWP concluded:

- The CoMaxLine%-Risk approach may be better than the CoMaxLine% approach.
- Neither the Correlation Factor approach nor the HHI approach represents the data significantly better than the CoMaxLine% approach, for both reserve risk and premium risk.

Given the prior DCWP findings and this Committee's analysis of current data, this Committee prioritized the MDC calibration over further analysis of alternatives to the CoMaxLine% approach.

4. GLOSSARY

Glossary – Part 1

Term	Definition/Description
10x11 size/diversification bands	Company data reflecting 10 size deciles and 11 diversification (monoline plus 10 multiline) deciles
1x1 size/diversification band	Aggregate company data for size bands B through E and multiline diversification bands 1 through 5 (excluding monoline)
1x6 size/diversification bands	Aggregate company data for size bands B through E and each diversification band (monoline plus 5 multiline)
5x6 size/diversification bands	Company data reflecting 5 size quintiles and 6 diversification (monoline plus 5 multiline) quintiles
ACL	Authorized Control Level required capital from the RBC Formula: 50% of CAL.
AYUL	Accident Year Underwriting Loss, in dollars
AYUL%	Accident Year Underwriting Loss as a percentage of premium
CAL	Company Action Level: required capital value from the RBC Formula.
CoMaxLine%-Risk	Method of Measuring LOB Concentration reflecting Volume of Premium Risk or Reserve Risk Charges
CoMaxLine%	Company Maximum Line Percentage of Business
CoMaxLine% Approach	Method of Measuring LOB Concentration reflecting the Company's Maximum Line Percentage of Business
CoMaxLine%-Volume	Method of Measuring LOB Concentration reflecting Volume of Premiums or Reserves
Committee	American Academy of Actuaries Property and Casualty Risk-Based Capital Committee
Concentration Ratio or concentration index	LOB Concentration used in determining the company diversification grouping
Correlation Factor	Measure of “pairwise” LOB correlation (100% if two LOBs are fully correlated with each other)
Correlation Matrix	Matrix of all “pairwise” LOB correlations used to determine aggregate risk in Solvency II
DCWP or CAS DCWP	Casualty Actuarial Society (CAS) Dependency and Calibration Working Party
Diversification Credit	One minus Premium Concentration Factor or Loss Concentration Factor (for premiums and reserves, respectively)
Diversification index	One minus Concentration Ratio
Expense Ratio	2017 industry net expenses divided by net earned premium, from the 2017 Insurance Expense Exhibit, by LOB.
HHI	Herfindal-Hirschman Index of concentration reflecting relative volumes of all LOB Premiums or Reserves
HHI-Risk	Method of Measuring LOB Concentration reflecting Relative Volumes of all LOB Premium or Reserve Risk Charges

Term	Definition/Description
HHI-Volume	Method of Measuring LOB Concentration reflecting Relative Volumes of all LOB Premiums or Reserves
IIA	Investment Income Adjustment; Also referred to as Line 7/8.
Initial reserve	The reserve at the selected valuation date.
Initial Reserve Year	The year ending at the selected valuation date. This is usually the year of the least mature AY in the reserve, i.e., the initial reserve year for the reserves as of December 31, 1995, is 1995.
LCF	Loss Concentration Factor is measured as the largest of 19 RBC LOB reserves divided by total reserves.
Line 4 Factor	Risk factor, line in RBC Formula PR017, PR018.
Line 7/8 Factor	IIA, row in RBC Formula, PR017 (Line 8) and PR018 (Line 7).
LOB	Line of Business
LR	Loss Ratio, loss and all loss adjustment expenses divided by earned premium, net of reinsurance.
MDC	Maximum Diversification Credit included in the RBC Formula (currently 30%)
NOC	"NOC," standing for Not Otherwise Classified, means companies for which the portion of net written premium plus loss reserves is greatest for the sum of the following LOBs: G-SL, K-Fid/Sur, L-Other, M-Intl, or S-FG/MG. See definitions in Part 2 of this Glossary.
PCF	The Premium Concentration Factor is measured as the largest of 19 RBC LOB premiums divided by total premiums.
PR017	Page of the P&C RBC Formula that contains the main calculations for the reserve risk component of R4 UW Risk—Reserves.
PR018	Page of the P&C RBC Formula that contains the main calculations for the premium risk component of R5 UW Risk—Net Written Premium.
Premium IIA	Investment Income Adjustment for premium risk. Line 7 on page PR018.
Premium risk charge	Premium risk charge for LOBs generally.
Premium risk charge $_{LOB}$	Our analysis uses the simplified formula: Premium Risk Factor $_{LOB}$ * IIA $_{LOB}$ + Industry Average Expense Ratio $_{LOB}$ - 100%
Premium risk factor	Line 4 in RBC Formula PR018
R0	Part of the RBC Formula for Affiliated Insurance Companies and Misc. Other Amounts.
R2	Part of the RBC Formula for Equity Assets.
R4 or R4- UW Risk—Reserves	Part of the RBC Formula for UW Risk—Reserves RBC mainly using page PR017.
R5 or R5 - UW Risk—Net Written Premium	Part of the RBC Formula for UW Risk—Net Written Premium RBC, mainly using page PR018.
RBC	Risk-Based Capital

Term	Definition/Description
RBC Formula	Risk-Based Capital Formula promulgated by the NAIC for use in solvency monitoring of company Annual Statements.
R_{CAT}	Part of the RBC Formula that accounts for earthquake and hurricane premium risk.[105]
Reserve IIA	Investment Income Adjustment for reserve risk. Line 8 on page PR017.
Reserve Risk Charge	Reserve risk charge for LOBs generally.
Reserve Risk Charge $_{LOB}$	Our analysis uses the simplified formula: (1.0 + Reserve Risk Factor $_{LOB}$) * IIA $_{LOB}$ - 100%
Reserve Risk Factor	Line 4 in RBC Formula PR017
RRR	Reserve Runoff Ratio
TAC	Total Adjusted Capital as defined in the RBC Formula.
Ten-Year LOBs	LOBs for which Schedule P contains information on the most recent 10 AYs.
Two-Year LOBs	LOBs for which Schedule P (prior to 2024 AS) contains information on the most recent 2 AYs.
Working Group or NAIC Working Group	National Association of Insurance Commissioners' Property and Casualty Risk-Based Capital Working Group

[105] The NAIC P&C RBC Committee Catastrophe Risk (E) Subgroup annually publishes a catastrophe event list on its website to guide companies as to which events from the most recent 10 years should be included in their catastrophe experience disclosed in PR101, PR102, etc. These events include US and non-US earthquakes, hurricanes, and tropical storms, consistent with the perils modeled for R_{CAT} (August 2017 CIPR Newsletter).

Glossary Part 2 – LOB descriptions

(1)	(2)	(3)	(4)
Schedule P LOB Name	**RBC LOB Name (PR017 and PR018)**	**Schedule P Letter Code**	**Short Label**
Homeowners & Farmowners	H/F	A	HO
Private Passenger Auto Liability	PPA	B	PPA
Commercial Auto Liability	CA	C	CA
Workers' Compensation	WC	D	WC
Commercial Multiple Peril	CMP	E	CMP
Medical Professional Liability (Occurrence)	MPL OCCURRENCE	F1	MPL-O
Medical Professional Liability (Claims Made)	MPL CLMS MADE	F2	MPL-C
Special Liability (Note 1)	SL	G	SL
Other Liability: Claims Made and Other Liability: Occurrence	OL	H	OL
Special Property (Note 2)	SPECIAL PROPERTY	I	SP
Auto Physical Damage	AUTO PHYSICAL DAMAGE	J	APD
Fidelity & Surety	FIDELITY/SURETY	K	Fid/Sur
Other (Inc Credit, Accident & Health) (Note 3)	OTHER (INCLUDE CREDIT, A&H)	L	Other
International (Note 4)	INTL	M	Intl
Reinsurance: Nonproportional Assumed Financial and Reinsurance: Nonproportional Assumed Property	REIN PROPERTY & FINANCIAL LINES	N	Re-Prop
Reinsurance: Nonproportional Assumed Liability	REIN LIABILITY	O	Re-Liab
Product Liability: Claims Made and Product Liability: Occurrence	PL	R	PL
Financial & Mortgage Guaranty	FINANCIAL/MORTGAGE GUARANTY	S	FG/MG
Warranty	WARRANTY	T	Wrnty

The 19 RBC LOBs are a subset of the 22 Schedule P LOBs, which are a subset of the 45 Statutory Page 14 LOBs, plus write-in LOBs in the "Underwriting and Investment Exhibit Part 1 Premium Earned" section of the Annual Statement.

Note 1: Special Liability consists of Statutory Page 14 LOBs: Ocean Marine, Aircraft (all perils), and Boiler and Machinery (Statutory Page 14 LOBs 8, 22, and 27).

Note 2: Special Property consists of Statutory Page 14 LOBs: Fire, Allied Lines, Inland Marine, Earthquake, and Burglary and Theft (Statutory Page 14 LOBs 1, 2, 9,12, and 26).

Note 3: Other (Inc Credit, Accident & Health) consists of Statutory Page 14 LOBs: Group A&H, Credit A&H (group and individual), Other A&H, and Credit (Statutory Page 14 LOBs 13, 14, 15, and 28)

Note 4: LOB International consists of non-US business that cannot be identified by Statutory Page 14 LOB in the 2017 Annual Statement.

P&C RBC - Comparison of RBC Action Level between Current RBC Formula and RBC Formula with suggested 45% for premium and 65% for loss concentration Factors

(All Companies)

		2024 RBC Action Level under Current RBC Formula						
		MCL	ACL	RAL	CAL	Trend Test	No Action	Total
2024 RBC Action Level with Academy suggested 45% for premium and 65% for loss concentration factors	MCL	21						21
	ACL		1					1
	RAL		1	15				16
	CAL			1	13			14
	Trend Test				1		2494	2,495
	No Action				1	19		20
	Total	21	2	16	15	19	2,494	2,567

(All Companies)

		2025 RBC Action Level under Current RBC Formula						
		MCL	ACL	RAL	CAL	Trend Test	No Action	Total
2025 RBC Action Level with Academy suggested 45% for premium and 65% for loss concentration factors	MCL	12						12
	ACL		5					5
	RAL			6				6
	CAL			1	11			12
	Trend Test					10		10
	No Action					2	2,408	2,410
	Total	12	5	7	11	12	2,408	2,455