January 31, 2011

Mr. Alan Seeley
Chair, SMI RBC Subgroup
Capital Adequacy (E) Task Force
National Association of Insurance Commissioners

Dear Alan,

On behalf of the American Academy of Actuaries,[1] I am pleased to provide you the attached report in response to your request for assistance with the Solvency Modernization (SMI) project focusing on the NAIC's Risk-based Capital (RBC) formula.

Attached to this letter are separate sections prepared by the Academy's Health, Life, and Property/Casualty RBC committees with information on the following:

1. Any intended or expected safety levels for RBC in aggregate for the original Life, Health and P&C RBC formulas as well as any safety level calibrations underlying individual risk factors within the current formulas.

2. An identification of risks that are missing from RBC and a consideration of which of those risks may be reasonably quantifiable or otherwise merit inclusion in RBC. For those missing risks that may be quantifiable, advice on potential approaches to such quantification. This analysis should also consider potential enhancements, if any, to the inclusion of risk mitigation practices in RBC.

While there are three separate RBC formulas, there is at least one thing that they all have in common: None of the formulas contain an explicit safety level for aggregate RBC. The RBC formulas were not designed by establishing aggregate RBC at an explicit calibration level where this calibration level coincides with a statistical outcome. As explained in the attached, some of

[1] The American Academy of Actuaries is a 17,000-member professional association whose mission is to serve the public on behalf of the U.S. actuarial profession. The Academy assists public policymakers on all levels by providing leadership, objective expertise, and actuarial advice on risk and financial security issues. The Academy also sets qualification, practice, and professionalism standards for actuaries in the United States.

the capital charges for individual risks are defined by an explicit calibration point, but aggregate RBC in the US RBC formulas is based on the sum of the capital charges for each of the individual risks with an offset for assumed risk correlation. In addition, we have identified some risks that are not covered by the current formulas. We look forward to discussing our responses with the SMI RBC Subgroup in more detail. Please contact Craig Hanna at 202.223.8196 for scheduling.

Sincerely,

Mary Frances Miller
President, American Academy of Actuaries

cc: Kris DeFrain, Dan Swanson, Alex Krutov, Tim Wisecarver, Donna Novak, Tom Wildsmith, Nancy Bennett, Art Panighetti, Henry Siegel, Craig Hanna

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Reports of Property/Casualty Risk-Based Capital Committee:

- **Subcommittee on Safety Levels in Property/Casualty Risk-Based Capital**
- **Subcommittee on Missing Risks and Measurement Shortfalls**

Report of the American Academy of Actuaries' Subcommittee on Safety Levels in Property/Casualty Risk-Based Capital

Safety Levels in NAIC Property/Casualty Risk-Based Capital

Presented to the National Association of Insurance Commissioners' (NAIC) Solvency Modernization Initiative Subgroup of the Capital Adequacy Task Force

January 2011

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Subcommittee on Safety Levels in P/C RBC of the American Academy of Actuaries

Alex Krutov, FCAS, MAAA, ASA, CERA, Chair

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Property/Casualty Risk-Based Capital Committee
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Safety Levels In NAIC Property/Casualty Risk-Based Capital

This document provides a brief summary of considerations regarding the safety levels and calibration of the Property/Casualty Risk-Based Capital (RBC)[2] formula currently used by the National Association of Insurance Commissioners (NAIC).

Risk-Based Capital

The NAIC RBC system was created to protect the interests of policyholders and society by providing a capital adequacy standard related to risk and giving regulators the authority to enforce compliance.

The RBC calculation uses a standardized formula to determine a minimum amount of capital below which company or regulatory action is required. The degree of action depends upon the relation between the actual capital and the RBC result, as well as the existence of any mitigating or compounding issues.

The RBC system currently has four action and control levels:

Company Action Level	(200 percent of Authorized Control Level [ACL])
Regulatory Action Level	(150 percent of ACL)
Authorized Control Level	(100 percent of ACL)
Mandatory Control Level	(70 percent of ACL)

At the Company Action Level, the company must submit a plan to improve its capital position. At the Regulatory Action Level, the insurance commissioner is allowed to order corrective actions. At the Authorized Control Level, the insurance commissioner is authorized to take control of the company. At the Mandatory Control Level, the company must be taken into supervision.

Terminology

The term "safety level" used by the NAIC usually means the degree of certainty that an insurance company will be able to meet its financial obligations or that the financial losses from insurance company insolvencies will stay below a certain level.

In other words, "safety level" could refer to the probability of an insurance company being unable to fulfill its obligations to policyholders or others, the expected loss from such insolvencies, or any predetermined levels of risk measure(s) chosen to quantify insolvency risk. Examples of such statistical measures include probability of ruin (or, closely-related, Value-at-

2 Overview and Instructions for Companies, NAIC Property and Casualty Risk-Based Capital Report, National Association of Insurance Commissioners, 2010

Risk [VaR]) and expected policyholder deficit (or, closely-related, Tail Value-at-Risk [TVaR][3]), calculated over a certain time horizon.

The use of the term "safety level" usually implies that such a risk measure has been chosen and consistently applied to assess solvency of insurance companies.

Considerations and Observations

Given this definition of the term "safety level," the following observations can be made:

Choice of Minimum Required Capital Level

Proper choice of RBC level is an important factor in insurance solvency regulation. It should be guided by the goals of optimizing policyholder interests and facilitating the efficient function of the insurance industry.

- Setting required capital levels too low is undesirable, as it would lead to unacceptably high insolvency risk detrimental to policyholders and other parties.
- Overly stringent capital requirements also could damage policyholder interests in the long run by impeding competition and potentially creating affordability and accessibility problems.

Function and Importance of the NAIC Property/Casualty (P/C) RBC Formula

Introduction of the NAIC Risk-Based Capital framework in the 1990s was a major advance in insurance solvency regulation in the US.

- The NAIC RBC formulas calculate capital level requirements intended to be commensurate with the risk of insolvency faced by insurance companies.[4] Combined with RBC laws adopted in all relevant U.S. jurisdictions, and when used in conjunction with other solvency monitoring tools, it establishes risk-based company action warning levels and allows regulators to take control of an insurance company if its capital falls below defined minimum levels.
- The NAIC RBC formula, in conjunction with the rest of the solvency regulatory structure, has likely served an important role in limiting the number and financial costs of insolvencies in the insurance industry.

Effectiveness of RBC in Capturing Insolvency Risk

Analysis of the safety levels underlying the RBC formula includes examining how well capital charges in the RBC formula correspond to the true insolvency risk levels. RBC solvency targets

[3] TVaR is also referred to as Conditional VaR (CVaR) or Conditional Tail Expectation (CTE), though CTE sometimes has a slightly different meaning.

[4] Vincent Laurenzano, "Risk Based Capital Requirements for Property and Casualty Insurers: Rules and Prospects," in *The Financial Dynamics of the Insurance Industry*, E.I. Altman and I.T. Vanderhoof (Eds.), New York University, 1995.

are more useful to regulators if they more accurately capture the actual risks faced by insurance companies.

- While the present NAIC RBC formula is an important and useful tool, it does not fully capture, nor does it fully distinguish among, risks faced by insurance companies. One assessment of these risk measurement shortfalls is presented in the Report on Missing Risks and Measurement Shortfalls in the Current NAIC Property/Casualty Risk-Based Capital prepared by the P/C RBC Committee of the Academy.[5]
- As that report notes, certain risk elements are not directly reflected in the current NAIC RBC formula even though their magnitude can be significant. An example is the risk of wide-scale insurance losses from a hurricane or an earthquake; this and other examples are discussed in the aforementioned report.
- No standard risk-based capital formula can or should attempt to capture all company-specific risks. Certain risk elements are not material, while others cannot be accurately measured, and making company-specific risk provisions for them may be inappropriate. There are risk elements that may be best monitored outside of the standard RBC formula. The use of customized (internal) models, rather than one standard formula, if done properly, can lead to improved accuracy in the calculation of required capital. The current NAIC RBC framework does not include the option of using customized models. Rather, it requires that one standard formula be used for calculating regulatory capital. The use of a standard formula by every insurance company has both advantages and disadvantages.

Lack of True Statistical Calibration of Aggregate RBC

No statistical risk measure for the aggregate required capital was explicitly used in the design of and parameter selection for the current NAIC P/C RBC formula.

- The regulatory capital levels based on the formula cannot be viewed as corresponding to specific levels of a statistical risk measure because no such measure was explicitly chosen. This can be viewed as a weakness and an area of potential improvement in the current approach.
- While the reasoning behind the selection of some of the elements of the formula is not known, the process included both detailed financial analysis of many individual companies (to limit the number of "false positives" produced by the formula) and a review of insolvencies (to test for "false negatives.") That and other testing of the formula served as input into the final calibration of the formula and the choice of many specific factors.

[5] *Report on Missing Risks and Measurement Shortfalls in the Current NAIC Property/Casualty Risk-Based Capital*, Subcommittee on Missing Risks and Measurement Shortfalls of the Property/Casualty Risk-Based Capital Committee, American Academy of Actuaries, January 2011.

Mixture of Statistical and Judgment-Based Calibration in RBC

A significant degree of judgment was utilized in designing the current NAIC P/C RBC formula, choosing parameters used to calculate capital charges for individual risks, and specifying risk dependency.

- Some statistical testing was performed. For example, the asset risk charge for unaffiliated common stock can probably be seen as calibrated to the 95th percentile, or what was determined to be approximately equal to the 1 percent expected policyholder deficit ratio.[6,7]
- Expert judgment was the main determinant of risk factor choice. The factors used in the calculation of capital charges for most risks have not been statistically calibrated. For example, the choice of a 10 percent credit risk charge for reinsurance recoverables[8] appears not to be based on statistical analysis. Another example is the choice of capital risk factors for the underwriting risk charge, which does not seem to be based on a defined level of any statistical risk measure.
- Some factors and approaches were intended to provide incentives for certain behavior or for public policy reasons.[9]
- The approach used for calculating risk-based capital assumes that some risks are perfectly correlated, while others are not correlated at all ("covariance adjustment"). The way that risk dependency is reflected in the RBC formula is as important as the way individual risks are treated.

Challenge of Calibrating RBC

The difficulty of precise calibration of the risk-based capital formula faced by the NAIC is highlighted by the fact that non-U.S. jurisdictions seem to have been similarly challenged. This difficulty is also evident in the very selection of the level to which a chosen risk measure is calibrated.

- Standard formulas (when internal models are not used) in Solvency II,[10] the Swiss Solvency Test, and the Bermuda Monetary Authority approach all appear to use

[6] Sholom Feldblum, *NAIC Property/Casualty Insurance Company Risk-Based Capital Requirements*, Proceedings of the Casualty Actuarial Society, 1996, LXXXIII, pp. 297-435, available at www.casact.org/pubs/proceed/proceed96/96297.pdf.

[7] The specific factors were based on the recalibrated original common stock charge in the life insurance RBC formula. There are concerns about the consistency and accuracy of these calculations, and the data used may not reflect the current risks associated with this type of asset. The expected policyholder deficit level as calculated does not necessarily apply to an individual company. The question of the time horizon used in the calculation of the 95th percentile was never fully resolved.

[8] In addition, the factor is applied uniformly and does not reflect differences in the quality of reinsurance protection (reinsurer-specific credit risk) or reinsurer concentration level.

[9] Examples include not reflecting collateral in determining reinsurance credit risk and not treating small and large companies differently for the company-experience adjustment.

[10] This pertains to Solvency II in its current form. Future adjustments are expected.

significant judgment in risk factor and dependence ("correlation") calculations. It is not always possible to determine whether the target levels are achieved.

- In jurisdictions in which a concrete solvency risk measure is used or proposed, the choice of its particular level usually involves judgment. For example, Solvency II chooses the threshold of the 99.5 percent Value-at-Risk level, which generally implies a failure once in 200 years on average. To a significant degree, the chosen level appears to be based on judgment. Although it may be theoretically possible to determine the economically optimal solvency threshold, in practice, such a determination would still involve making a carefully-considered judgment call.

Individual Company Risk and Potential Industry Losses

The decision of what risk measure(s) to use and what levels of the risk measure(s) constitute appropriate "safety levels" also depend on whether the focus of the assessment is risk to an individual company or also to the whole insurance industry.

- The typical view is that, even though most factors in calculating individual company capital requirements may come from industry experience, the RBC formula is intended to look at the solvency of individual companies. This is a valid view that reflects the main purpose of risk-based capital requirements.
- Another relevant issue is the potential for large interdependent industry losses from insolvencies. The risk here is of systemic shocks to the industry, i.e., events affecting many insurance companies at the same time, leading to multiple related insolvencies. Standard formulas, focused on individual company risk assessment, and neglecting correlation among companies, do not fully mitigate this risk to the overall industry. While possibly small, this risk is seen by some as the most important, because simultaneous insolvencies by many companies can overwhelm the guaranty fund system and lead to widespread disruption in the way insurance markets function. One way to address this risk is to take into account the extreme scenarios incorporating such industry-wide events when calculating RBC for individual companies.

These are just some of the considerations regarding the safety levels and calibration of the Property/Casualty RBC formula currently used by the NAIC. A detailed description of the NAIC P/C RBC formula and the considerations involved in its development can be found in the *NAIC Property/Casualty Insurance Company Risk-Based Capital Requirements* article.[6] An intelligent and informative view on the future of solvency regulation is presented in "Financial Stability and Insurance Regulation: The Future of Prudential Regulation."[11] A useful discussion of the shortfalls and potential areas for improvement to the NAIC P/C RBC formula is contained

11 Terri Vaughan, "Financial Stability and Insurance Regulation: The Future of Prudential Regulation," *The Geneva Papers on Risk and Insurance*, Vol 29, No 22, April 2004, pp. 258-272.

in the *Missing Risks and Measurement Shortfalls in the Current NAIC Property/Casualty Risk-Based Capital* report, also prepared by this Committee.[5]

Report of the American Academy of Actuaries' Subcommittee on Missing Risks and Measurement Shortfalls

Missing Risks and Measurement Shortfalls in the Current NAIC Property/Casualty Risk-Based Capital Formula

Presented to the National Association of Insurance Commissioners' Solvency Modernization Initiative Subgroup of the Capital Adequacy Task Force

January 2011

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1. Subcommittee Charge

Charge

The charge of the Subcommittee on Missing Risks and Measurement Shortfalls of the Property/Casualty Risk-Based Capital (RBC) Committee is to prepare a document identifying apparent shortfalls in the National Association of Insurance Commissioners (NAIC) Property & Casualty (P/C) RBC formula and selecting the shortfalls that should be handled on a priority basis. The shortfalls considered include risks not reflected in the current formula and risks that are included but not fully captured by the formula.

Scope

From the perspective of this Subcommittee, a shortfall is identified as a case in which the measure either understates or overstates the risk.

The scope of work of this Subcommittee does not include providing specific recommendations on how to address those apparent shortfalls.

The Academy's Property/Casualty RBC Committee is working on a number of related issues. It has requested research assistance from the Casualty Actuarial Society (CAS) to complete some of its work.

This paper assumes the reader is generally familiar with the property/casualty RBC formula.[12]

Note

In this paper, references to "we," "our," or "the Subcommittee" allude to the Academy's Subcommittee on Missing Risks and Measurement Shortfalls of the Property/Casualty Risk-Based Capital Committee.

We use the term "Missing Risks" to include both missing risks and measurement shortfalls.

[12] For a comprehensive description of the formula and its initial basis, see Feldblum, Sholom, NAIC Property/Casualty Insurance Company Risk-Based Capital Requirements, *Proceedings of the Casualty Actuarial Society,* 1996.

2. Nature of Risks/Gaps in the RBC Formula ("Missing Risks")

RBC

The NAIC RBC system was created to provide a capital adequacy standard that is related to risk, raises a safety net for insurers, provides uniformity among the states, and supplies regulatory authority for timely action.[13]

The RBC calculation uses a standardized formula to determine a minimum amount of capital below which company or regulatory action is required. The degree of action depends on the relationship between the actual capital and the RBC result, as well as the existence of any mitigating or compounding issues.

The RBC currently has four action and control levels:

Company Action Level	(200 percent of Authorized Control Level [ACL])
Regulatory Action Level	(150 percent of ACL)
Authorized Control Level	(100 percent of ACL)
Mandatory Control Level (MCL)	(70 percent of ACL)

At the Company Action Level, the company must submit a plan to improve its capital position. At the Regulatory Action Level, the insurance commissioner is allowed to order corrective actions. At the Authorized Control Level, the insurance commissioner is authorized to take control of the company. At the Mandatory Control Level, the company must be taken into supervision.

Origin of Gaps

Gaps in the RBC formula can arise for a variety of reasons, including the following types:

1. A risk that is excluded intentionally.
2. A risk that is not recognized but should be.
3. A risk that is considered, but the impact of the risk is not sufficiently reflected in RBC parameter selection, e.g., because the events related to the risk are not fully reflected in the data from which the risk impact is measured.
4. Risks that are reflected, but the parameters do not sufficiently reflect variations in risk between companies.

A missing risk of type 1 may be intentionally excluded for a number of reasons. It may be excluded because the risk is not material or because the risk is outside the "window" considered by the capital system, e.g., outside the 1 in 200 year event horizon of Solvency II. It may be

[13] NAIC Risk-Based Capital, General Overview, July 2009, available at http://www.naic.org/documents/committees_e_capad_RBCoverview.pdf.

excluded because it is a risk that is not pre-funded by capital, e.g., liquidity, which is handled by liquidity strategies rather than capital.

Missing risks of types 2 or 3 will tend to understate the total industry RBC.

A missing risk of type 4 would tend to result in RBC that does not sufficiently reflect differences in capital requirements by company. A change in RBC formula for such risks would produce increases in RBC for some companies and decreases for other companies. With regard to type 4 missing risks, however, any capital formula that is not an individual company model will not reflect all company-to-company differences.

Practicality

A gap in the formula may also be identified from the perspective of practicality, and, from that perspective, risks may be classified as to whether:

1. We know how to measure them.
2. We are unsure of how to measure them, and analysis is required to determine whether a solution can be developed.
3. We currently do not know how to properly measure them.

This Subcommittee has considered the issue of practicality in selecting its priorities.

Historical Considerations

The P/C RBC formula was adopted in December 1993 to be effective in December 1994 Annual Statements. The analysis and decisions underlying the formula date from 1990-1993.[14] The formula reflects the following considerations during that time frame:

1. It provided for regulatory action when company capital fell below the RBC level, without requiring a lengthy court proceeding.
2. RBC was a very new regulatory arrangement, and the effect of its implementation was uncertain.
3. All data was to come from the Annual Statement.
4. Ease of calculation was important.
5. The basis and the results needed to be understandable and transparent to insurance executives and regulators.
6. It had to incent the right behavior and not incent the wrong behavior.
7. There was a lower level of familiarity with modeling by users (in-company, out-of-company, and within the regulatory community).

[14] The Subcommittee recognizes, and its conclusions reflect, the extent to which some of the factors have been changed since their initial implementation.

A number of the Subcommittee's overarching recommendations result from reconsidering the extent to which these considerations currently apply.

3. Approach

We first considered the major risk areas reflected in the current P/C RBC formula:

Table 1
RBC Risk Areas

R_0	Asset Risk – Subsidiary Insurance Cos
R_1	Asset Risk – Fixed Income
R_2	Asset Risk – Equity
R_3	Credit
R_4	Underwriting – Reserves
R_5	Underwriting – Premium
Other	Issues addressed in the overall formula

Then, within each of those risk areas, we considered the following:

- The experience of the Subcommittee members and others with whom the Subcommittee consulted.
- How RBC operates for the risks that are particular to specialized companies, such as reinsurers, mono-line companies (medical professional liability, auto, workers' compensation, and others), small regional carriers, etc.
- Risks considered in research related to Solvency II and other capital measures.

Next, we compiled a list of the risks or issues related to the RBC formula. Those lists, organized by risk area, are shown in Section 11.A to F. Section 11.G covers the risks and issues that do not readily fit within the individual risk categories, generally because they affect more than one risk area. In Section 10, we identify potential issues; we do not discuss or evaluate the issues. That would be a larger project than intended by this document.

Finally, we used these lists to select a small number of priority items. These priorities are listed in the summary Section 0 and discussed individually in Sections 5 to 9.

4. Priority Risks

The Subcommittee believes that the risks and calibrations that deserve the most attention in the short term are the following:

1. R5, R3 – Catastrophe risk
2. R3 – Credit for Reinsurance
3. R4 and R5 – Underwriting and Reserve Risk – – Investment Income Offset
4. R0, R1, R2 – Relationship between Life and P&C risk factors for assets and treatment of foreign affiliates
5. All – Specification of Risk Levels (i.e., the risk metric used, such as Value at Risk (VaR), Tail Value at Risk (TVaR), etc., and the value chosen for the risk metric and time horizon in determining various RBC levels.

The Property/Casualty Risk-Based Capital Committee of the Academy is reviewing the way some of these risks are reflected in the RBC formula, and the CAS is providing research assistance in the analysis of the underwriting risk factors in R4 and R5, risk dependency, and the overall structure of the RBC formula. Those broader reviews are important, but we have identified a set of more narrowly-focused issues corresponding to the Subcommittee charge.

5. Priority 1 – Natural and Man-Made Catastrophes (R5, R3)

Current Treatment

These risks are largely reflected in R5, underwriting – premium risk. The catastrophe risk is an implicit part of the factor applied to net earned premium.[15]

Shortfalls in the Current Treatment

Catastrophe risks are considered in the current RBC formula only to the extent that such catastrophes are part of the variation in loss ratios net of reinsurance that is used to calibrate the risk factors. This is problematic as the occurrence or non-occurrence of catastrophes is sufficiently random that any data set of observed data for a 10-year period is only a rough approximation of the actual risk.

Moreover, subject to the effect of the own-company adjustment, the RBC factors assume that, for relevant lines of business, each company's reinsurance program produces the same required risk-based capital, net of reinsurance, as the average company. That assumption is problematic in that individual companies' risk profiles vary significantly. Also, use of the industry factors assumes that the relative exposure of different companies to the risk is adequately represented by written premium reported in the Schedule P line.

The own-company adjustment is not specifically designed to, and is unlikely to, correct for these shortfalls in the catastrophe treatment. Therefore, these issues remain.

Catastrophes may also create credit risk associated with the reinsurance recoveries from such events. Even companies with the same catastrophe risk net of reinsurance may have different ceded reinsurance credit risks that are not reflected in the formula.

The R3 reinsurance credit risk factor is 10 percent applied to existing (i.e., balance sheet) ceded loss reserves and does not consider the potential reinsurance credit risk for future significant events such as catastrophes. Also, R3 does not adequately distinguish the ceded reinsurance credit risk between companies that may have the same level of catastrophe risk net of reinsurance but different levels of risk gross of reinsurance.

Historical Observations

The current treatment of catastrophes in the P/C RBC formula reflects the historical considerations described in Section 2, in particular:

[15] If there are unpaid claim reserves related to a catastrophe event, then R3 includes a reinsurance credit risk component equal to 10 percent of the ceded loss reserve.

1. At the time the RBC formula was developed, input data was to be publicly available, coming from an Annual Statement that would be audited.

   Currently, while most data used in the RBC formula is from the Annual Statement, there are some exceptions.

The current treatment of catastrophes in the RBC formula reflects the limitations in technology that was used at the time the RBC formula was designed:

2. At the time the RBC formula was developed, catastrophe models were seen as less reliable, and the routine use of such models was less extensive than it is today.

   Catastrophe modeling is now routinely used in primary and reinsurance pricing and is typically part of insurance company reporting to rating agencies.

The Catastrophe Risk Subgroup of the Property/Casualty Risk-Based Capital Working Group of the Capital Adequacy Task Force is studying the incorporation of a property catastrophe risk into the RBC formula. The Property/Casualty Risk-Based Capital Committee of the Academy intends to provide comments to assist in the development of the catastrophe charge in the NAIC RBC formula.

Desirable Changes

The optimum change would include the following:

1. Assessment of gross and net risk related to all types of catastrophes based on appropriate modeling of individual company exposures
2. "Catastrophes" would include hurricanes, earthquakes, regional storms (e.g., tornadoes),[16] terrorism,[17] and any other property-related catastrophe risks specific to the company.
3. An assessment of the risk based on a specified metric, e.g., does RBC provide for a 1 in 100, 1 in 200, 1 in 250, or 1 in 500 year event?
4. The availability and cost of reinstatement premiums for second and subsequent events
5. The cost of associated assessments, such as those from windstorm pools and other residual market mechanisms
6. The cost for both property lines and the workers' compensation line (especially with regard to earthquakes).

[16] Regional tornadoes, hail, etc. may not be significant for larger insurers with geographic diversification and catastrophe protection limits required by hurricane and earthquake risk. However, regional tornadoes, hail, etc. may be significant for some companies.

[17] Including property, workers' compensation, accident and health liability, and other claims arising from terrorist events.

7. Credit risk on reinsurance recoveries (R3), including likely increases in credit risk for many reinsurance programs in the event of multiple major catastrophes, both in terms of a higher company reinsurance recoverable post-event, as well as the risk of increased reinsurer default after a significant industry event.

Considerations Related to the Desirable Changes

1. The desired change is more easily handled for hurricane and earthquake exposure, less easily handled for terrorism and regional exposures, and, to some extent, less easily handled for exposures outside the U.S. (although expansion of regulatory attention to catastrophe assessment outside the U.S. helps in that regard).
2. While terrorism risk assessment may be more difficult, it is potentially a larger addition to the RBC requirement for some companies.
3. The impact of the Terrorism Risk Insurance Act of 2002 (TRIA) and its progeny in mitigating terrorism risk should be considered, to the extent that a charge for terrorism risk is included.
4. All else equal, the remaining net premium RBC factors (R5) may need to be reduced in light of any separate provision for catastrophe risk, although likely not by the full amount of the capital requirements indicated by catastrophes alone.
5. After the first event, reinsurance credit risk for second event coverage may be greater than credit risk for the first event, as the reinsurance industry security post-catastrophe would be lower than pre-catastrophe.
6. The use of "realistic disaster scenarios,"[18] in part standardized across companies, may help address more complex risks that do not fit standard models.
7. As it may not be possible to model some types of catastrophe risks, a provision for the remaining risk may be necessary
8. The change discussed above relates to property catastrophes,[19] although liability catastrophes, commonly known as mass torts, also deserve RBC attention.

[18] Perhaps, in part, "realistic disaster scenarios" could be standardized across the industry, by regulatory action, by accepted business practice, or otherwise.

[19] This change relates to property catastrophes including workers' compensation, accident and health liability, and other claims arising from initially property-related events.

6. Priority 2 – Credit for Reinsurance (R3)

Current Treatment

Reinsurance credit risk factor is 10 percent applied to ceded loss reserves.

Various factors are applied to other receivables.

Shortfalls in the Current Treatment

The factor is based on judgments applied to a number of interrelated issues and is not based on statistical analysis.

The current factor is not calibrated to a particular risk level.

The factor does not reflect variation in credit risk by reinsurer.

The R3 reinsurance credit risk factor does not consider the potential reinsurance credit risk for future significant events like catastrophes.

Historical Observations

The 10 percent charge is intended to reflect four elements:

- pure reinsurer credit risk,
- the extent to which the ceded reinsurance liability may be underestimated,
- the extent to which risk transfer to the reinsurer may be limited,[20]
- the possibility of disputes regarding coverage.

At the time of development, there was significant concern about the quality of reinsurance.

The uniform 10 percent factor, regardless of whether the reinsurer was large or small, U.S. or alien, or subject to collateral or not, resulted in part from an effort to avoid creating unnecessary bias for or against the purchase of reinsurance generally or purchases from different types of insurers.

Conditions have changed in that:

[20] Many reinsurance contracts do not contain full risk transfer. For example, there may be loss ratio or other limits on the aggregate amounts recoverable from the reinsurer or additional premiums payable to the reinsurer based on the ceded claims amount. Since the effect of loss limits and additional premiums are not reflected, the reinsurance credit risk charge was set at a higher level than would otherwise be the case.

- There is increased financial and regulatory scrutiny of insurers and reinsurers in the U.S. and in other jurisdictions.
- There is increased attention to gross and ceded reserves in addition to net reserves.
- Risk transfer aspects of reinsurance are monitored much more closely to limit the financial reporting benefit from reinsurance transactions that do not have sufficient risk transfer, including extensive disclosures in the Annual Statement and an attestation of the CEO and CFO as to the treatment of reinsurance.
- In part because of the increased attention on risk transfer, it is currently common to use modeling to measure the extent of risk transfer.

Desirable Changes

The optimum change would include the following:

1. Consideration of each risk component.
2. Modeled charges for limits on risk transfer, as part of point 1 above.
3. Realistic charges for credit risk, possibly including recognition of concentration risk in counterparties or, alternatively, diversification benefits when multiple counterparties are utilized, as well as the reinsurer-specific credit risk.
4. Modeled charges for limits on risk transfer.
5. Charge for risk of reinsurance disputes based on modeling or judgment.

Considerations Related to the Desirable Changes

Changes in the credit risk charges could have an important effect on company behavior in purchasing reinsurance; therefore, RBC changes must be well-considered.

7. Priority 3 – Underwriting Risk Factors – Investment Income Offset (R4, R5)

Current Treatment

The premium and loss reserve factors in R4 and R5 are based first on risk factors gross of future investment, and then those factors are reduced using a 5 percent interest rate over the expected payment period.

Shortfalls in the Current Treatment

The interest rate has remained at 5 percent even though the available yields have decreased over time and are currently at all-time lows.

Historical Observations

The 5 percent interest rate was selected when interest rates on new funds were 7 percent or more.

Desirable Changes

Update factors based on current yields, resulting in a more realistic reflection of investment income.

Considerations Related to the Desirable Changes

The margin over risk-free rates must be selected, if the factors are to be related to, but higher than, risk free rates.

In theory, the interest rate used to adjust the premium factors should vary annually and be current each year. The interest discount used to adjust the reserve factors should vary with changes in the embedded yields. Embedded yield depends on the extent to which assets are valued at amortized cost or market value.

Year-to-year movement in RBC factors may be viewed as undesirable, particularly as the movement may be both up and down over time. Therefore, factors may be adjusted on a moving-average basis, or factors may be changed periodically, e.g., every two or three years.

To the extent that other changes in underwriting factors are expected, the change in interest rate may be made at the same time. However, the change in interest rate can be done without an overhaul of the underwriting factors, because this change in interest rate is a separable issue and may be more straightforward than changes in underwriting factors, generally.

8. Priority 4 – Asset Factors (R0, R1, R2)

Current Treatment

Factors are applied to various types of assets. The Subcommittee notes the following:

1. With respect to insurance affiliates for which RBC is not available, the RBC factor for alien affiliates is 0.50 of book value, and the RBC factor for other affiliated insurers is 0.225.
2. Except in specific situations, RBC asset factors are the same for life, health, and P&C companies.

Shortfalls in the Current Treatment

There were a number of judgments, but no statistical basis, for the treatment of alien insurance affiliates and other affiliated insurers not subject to RBC.

The asset treatment does not recognize the differences in the relationship of assets and liabilities for life and P&C companies.

The treatment includes ad hoc adjustments but no statistical analysis to recognize the differences in accounting treatments for life and P&C companies for certain assets, e.g., fixed income assets in NAIC categories 3, 4, and 5.

Historical Observations

There was no RBC equivalent for alien insurers, and there were concerns about financial reporting and regulation in some non-U.S. jurisdictions. Currently, however, for insurers and reinsurers in other jurisdictions, there is increased use of capital standards, increased level of financial and regulatory scrutiny, increased transparency, increased convergence in financial reporting rules, and more routine communication among regulators.

At the time that RBC was developed, there was far less analysis of asset and liability issues for P&C companies than for life companies, and there was a view that assets should be treated alike for the two kinds of companies.

Desirable Changes

The optimum change would include the following:

1. Alien reinsurers – re-evaluate the RBC charge for alien insurance affiliates.
2. Clarify the basis for P&C factors relative to life factors, considering differences in annual statement valuation and differences in cash flow obligations between the two types of insurance businesses.

Considerations Related to the Desirable Changes

The present treatment was designed thoughtfully, and there may be no practical alternatives.

Converting alien insurer capital requirements to RBC levels of security may be problematic and not necessarily better than the current treatment.

9. Priority 5 – Increased Precision in Specifying Risk Levels (All)

Current Treatment

Individual risks are calibrated to standards of varying degrees of transparency.

The combined P/C RBC is the result of the covariance formula:

RBC = R0´ + square root $[(R1´)^2 + (R2´)^2 + (R3´)^2 + (R4´)^2 + (R5´)^2]$

where

R0´=R0 less the portions of R0 that are included in R1´ and R2´

R1´= R1 + R0 for fixed income investments of non-insurance affiliates

R2´=R2 + R0 for equity investments of non-insurance affiliates

R3´= (R3)/2

R4´=R4+ (R3)/2

R5´=R5

The risk measures as well as the target risk level tolerance are not specified, but the purpose is to specify four levels of regulatory action depending on the relationship between the "adjusted surplus" held by the company and the "risk-based capital" surplus: (1) the Company Action Level, at which a company must submit a plan to improve its capital position; (2) the Regulatory Action Level, at which the insurance commissioner is allowed to order corrective actions; (3) the ACL, at which the insurance commissioner is authorized to take control of the company; and (4) the MCL at which point the company must be taken into supervision.

Shortfalls in the Current Treatment

Individual risk charges and the combined RBC are not universally calibrated to a transparent risk tolerance against a specified risk metric (VaR, TVaR, confidence level, etc.) and time horizon.

With respect to individual charges, the lack of transparency makes it difficult to express a view on whether a particular charge is too high or too low.

With respect to the combined charge, the lack of transparency makes it difficult to express a view on whether the method of combining individual risks within the formula achieves the objective of the formula. Moreover, it makes it difficult for regulators to compare results across jurisdictions internationally.

Desirable Changes

The optimum change would include the following:

1. To the extent practical, specify the existing risk tolerances, including risk measures and time horizons, by risk and in total, explicit or implicit.
2. To the extent those risk tolerances are based on outdated studies, reevaluate the implication of the parameters against current data.
3. Recognizing that there are limits in the extent to which the risk levels in all the details can be determined, design a roadmap to improving their specificity over time.
4. Consider the risk levels implied by the Company Action, Regulatory Action, Authorized Control, and Mandatory Control Levels.
5. If the regulators were to choose a target, assess the degree to which the formula meets that target.

Considerations Related to the Desirable Changes

Information (distributions) for some significant factors is not available. Thus, the level of risk is not fully known, and any assessment will be, in part, a subjective expert judgment.

Is specifying a level of risk useful, given the purpose of the RBC formula?

There are a number of issues to consider in specifying the risk measure and tolerance:

(a) risk measures such as VaR, TVaR, etc.,

(b) risk tolerance such as 1 in 200, or 1 in 50, 1 percent expected policyholder deficit, etc.,

(c) time horizon such as runoff, one year, or multiple year.

An analysis of all risks may not be practical. In such instances, the analysis might be limited to a subset of risks. For that subset of risks, in aggregate, the analysis should aim to determine a ruin probability, or another risk measure, due to a combination of stochastic and parameter risks, over a specified time period.

10. Analysis

In the following subsections A to F, we consider each of the six risk areas. In each area, we outline the current RBC method and list issues that may be considered in an assessment of gaps in the RBC formula. In subsection G, we list issues that do not readily fit within the six risk categories, generally because they affect more than one risk area. It is beyond the scope of this work to discuss and analyze each of the issues identified in these subsections.

We used the lists to select the "priority" items discussed in Sections 6-10 above.

A. R_0– Asset Risk – Subsidiaries (Affiliate Risk)

Current RBC Method – Key Points

The R0 risk relates to investments in insurance affiliates, non-controlled assets, guarantees for affiliates, and contingent liabilities. The RBC calculations can be complex because the structure of insurance groups can be complex. In simplified terms, the RBC calculation is outlined below.

For directly- and indirectly-owned insurance affiliates, the risk charge is the RBC charge of the affiliate.

Some insurance affiliates are not subject to RBC. These affiliates include owned alien affiliates, title insurers, mono-line financial insurers, and mortgage guarantee insurers. For these insurance affiliates, the RBC charge equals a factor applied to the statement value. The factors are 0.50 for alien affiliates and 0.225 for other affiliates, and these factors are intended to represent the RBC requirements for those insurers.

For non-insurance investment affiliates, factors are applied based on the underlying assets or liabilities of the affiliate. This category includes both managed care organization affiliates and investment affiliates.[21]

In addition there is a .01 charge for off-balance sheet items including non-controlled assets, guarantees for affiliates, and contingent liabilities. A lower factor, 0.002, is applied for security lending programs that meet specified criteria.

Issues to Consider

1. There were a number of judgments, but no statistical basis, for the treatment of alien affiliates. (Priority item 2)
2. The risk charges for affiliates are not calibrated to a transparent risk level. (Priority item 5)

[21] For purposes of the covariance formula, this portion of the R0 is transferred to R1 or R2 for fixed income or equity assets, respectively.

3. There is no charge for risks that parent companies or other group companies (insurers or non-insurers) create for the subject insurer ("group risk").
4. The definition of "off-balance sheet risk" may not be broad enough, even though off-balance sheet items were reviewed by the NAIC in 2008.
5. Non-insurance affiliates can create risks unrelated to the specifics of the assets or liabilities of the affiliate.
6. The charge for alien affiliates does not consider the extent to which alien insurers are now subject to capital requirements.

B. R_1– Asset Risk – Fixed Income (Fixed Income Risk)

Current RBC Method – Key Points

Assets in this category include cash, bonds, collateral loans, mortgage loans, short-term investments, cash, and other long-term invested assets.

The risk charge is determined by factors that are applied to the statement value of fixed income assets.

Property Casualty Annual Statement values for fixed income assets are amortized cost for NAIC categories 1 and 2 and market value for NAIC categories 3-6.[22]

There is a concentration adjustment for assets (fixed or equity) from a single issuer. R1 includes the fixed income component of that adjustment.

There is a bond size factor to reflect diversification in the bond portfolio.

Issues to Consider

1. There were a number of judgments, but no statistical basis, for the treatment of alien insurance affiliates and other affiliated insurers not subject to RBC. (Priority item 4)
2. The treatment of assets does not recognize the differences in the relationship of assets and liabilities for life and P&C companies. The treatment includes adjustments, but no statistical analysis, to recognize the differences in accounting treatments for Life and P&C companies (fixed income NAIC categories 3, 4, and 5). (Priority item 4)
3. While most risk charges were calibrated to a 95 percent one-year confidence level, some were not calibrated to any specified risk metric, e.g., VaR, TVaR, confidence level, etc., or risk level and time horizon. (Priority item 5)
4. Are the NAIC fixed income categories too broad? For example, should risk factors distinguish between municipal vs. corporate vs. other, beyond those reflected in the NAIC categories?
5. Should there be differences among the types of mortgages and mortgage-linked securities and their inherent risks, beyond those reflected in the NAIC categories?
6. Should liquidity (ability to convert to cash) be considered for all asset classes?
7. For state and municipal assets, should there be a state concentration factor, which would be similar to the single issuer concentration factor?
8. Structured investment products may appear to be fixed income assets, but the risks may be greater than for normal fixed income products.
9. Should the bond size factor be simplified or eliminated?

[22] Life Annual Statement values are amortized values for categories 1-5.

10. Should investments in sectors or asset classes highly correlated with insurance risk be subject to a higher risk charge or, alternatively, receive less diversification benefit? Examples include direct investment in insurance holding company debt, risk-linked securities such as catastrophe bonds, or structured products consisting of securitized pools of surplus notes.

C. R_2 – Asset Risk – Equity (Equity Risk)

Current RBC Method – Key Points

Assets in this category include unaffiliated common and preferred stock, owned real estate, and other invested assets.

The risk charge is determined by factors that are applied to the statement value of equity assets.

Statement value of equity assets are market values.

There is a concentration adjustment for assets (fixed or equity) from a single issuer. R2 includes the equity component of that adjustment.

Issues to Consider

1. Some risk charges were calibrated, for example, to a 95 percent one-year confidence level or expected policyholder deficit,[23] but some are not calibrated to a specified risk metric, e.g., VaR, TVaR, confidence level, etc., or risk level and time horizon. (Priority item 5)
2. Are risks related to owned real estate properly handled?
3. There is no adjustment for the stock portfolio "beta" or for the risk associated with equity investments that are concentrated in certain industries.
4. Should the risk factor be adjusted if the company has specific risk mitigation plans in place if asset values fall below a certain threshold?
5. The Life and P&C equity charge for unaffiliated common stocks are different.[24]
6. Does the deferred tax credit treatment need further review?
7. Should investments highly correlated with the insurance cycle be subject to a risk surcharge or allowed a reduced diversification benefit?

[23] Feldblum page 308-9

[24] For health companies, the equity risk charge is the same as for P&C companies.

D. R_3 – Credit Risk

Current RBC Method – Key Points

The credit risk charge equals RBC factors times various balance sheet assets for which there are apparent credit risks. The main asset in this category is often credit for reinsurance recoverables.

The reinsurance credit risk factor is 10 percent applied to existing (i.e., balance sheet) ceded loss reserves.

Issues to Consider

1. Does the formula adequately address the credit risk arising from reinsurance related to catastrophes that might affect policies written but not yet earned? (Priority item 1)
2. The reinsurance credit risk charge is based on the considerations discussed in Section 6 rather than empirical observations of risk impact. (Priority item 2)
3. The current factor is not calibrated to a particular risk level. (Priority items 1 and 5)
4. Differences in reinsurer credit risk level are not considered.
5. Reinsurer concentration risk is not reflected.
6. Should there be different credit risk treatment if a company has credit risk exposure that differs from the norm, e.g., higher than average exposure to agents' balances (including exposure to fast-growing agents' balances), miscellaneous receivables, etc.?
7. Liability reinsurance credit risk extends over longer payment periods than property reinsurance credit risk, but that additional risk is not reflected in the current credit risk charge.
8. Treatment of reinsurance collateral and any interrelationship to the RBC charge.
9. The structure of reinsurance credit charges could have an important effect on company behavior in purchasing reinsurance, and, therefore, RBC changes may have unintended and possibly undesirable consequences.
10. Reinsurance credit risk might vary with the underwriting cycle, but this is not reflected in the current formula.
11. A company's current and historical position with respect to reinsurance disputes may be relevant to the risk assessment.

E. R_4 – Underwriting Risk – Reserves

Current RBC Method – Key Points

This risk charge equals net reserves by Schedule P reserve line of business multiplied by risk factors for each line of business.

The result is adjusted by individual company adverse development experience compared to industry experience using a 50/50 rule.

There is a credit for investment income earned as claims are paid.

There is a credit for loss sensitive contracts.

Risks by line of business are combined with a diversification formula ("70 percent rule").

The initial risk factors are developed from industry adverse loss development ratios by company/Schedule P line of business – individual company ratios are averaged (greatest average value over 9 years used to avoid giving undue influence to larger carriers) to determine the reserve charge. That result is adjusted before it is used.

Issues to Consider

1. The interest rate for the investment income credit has remained at 5 percent, even though the available yields have decreased over time and are currently at all-time lows. (Priority item 3)
2. The risk charges are not calibrated to a transparent risk level. (Priority item 5).
3. The method of calibrating the factors is not completely transparent.
4. Is dependency between lines of business adequately considered?
5. Is the 70 percent rule an appropriate way to measure diversification?
6. The interest rate for investment income credit does not vary based on the duration of the liabilities, even though the yield curve means returns are larger for longer-duration liabilities than shorter-duration liabilities.
7. Should the interest rate be based on a stochastic model?
8. Are the adjustments for loss-sensitive contracts appropriate?
9. Do the charges properly consider risks from unusual causes that are not well-represented in past history, such as:
    a. Risks that are observed but not necessarily considered adequately in calibration for the future – asbestos and pollution claims, construction defect claims, etc.
    b. Risks that are not observed yet (emerging risks) – climate change, nanotechnology, etc.

10. Line of business concentration – do factors apply equally well to companies that are diversified across multiple lines of business as they do to companies with few or even one line of business?
11. Regional concentration – do factors apply equally well to companies that are diversified across regions as they do to companies that are diversified across geography?
12. Risk of reserve inadequacy from mandatory or voluntary pool participation may not be fully recognized by the risk factor calibration method.
13. Does the current treatment of assumed retroactive reinsurance, subject to deposit accounting for Annual Statement purposes, properly reflect the risk involved?
14. Should the reserve factors be adjusted to reflect the position in the underwriting cycle, as reserve adequacy is sometimes seen to vary with rate adequacy?
15. Is the 50/50 treatment of company and industry loss reserve development appropriate?
16. Company size is not reflected, but smaller companies may have greater relative reserve variability (law of large numbers).
17. As the RBC formula relies primarily on NAIC Annual Statement lines of business, risk differences for categories within Annual Statement lines of business may not be sufficiently reflected. For example, the risk factors are the same of Directors' and Officers' (D&O) policies, lawyers' professional liability policies, and liability policies for both small and large retail businesses. Does this obscure significant risk differences?[25]
18. Should the risk factors be higher for new companies and companies with new lines of business or operations in new geographic areas?[26]

[25] Some portion of the difference would be reflected by the adjustment for individual company experiences.

[26] Some portion of the difference might be reflected in the growth charge.

F. R_5 – Underwriting Risk – Premiums

Current RBC Method – Key Points

This risk charge equals net premium by Schedule P lines of business multiplied by risk factors for each line of business.

The result is adjusted by individual company adverse development experience compared to industry experience using a 50/50 rule.

An additional charge is applied for "excess growth."

There is a credit for investment income earned as claims are paid.

There is a credit for loss-sensitive contracts.

Risks by line of business are combined with a diversification formula ("70 percent rule").

The initial risk factors are developed from industry loss ratios by company/Schedule P line of business; individual company loss ratios are averaged (greatest average value over 9 years used to avoid giving undue influence to larger carriers) to determine the premium charge. That result is adjusted before it is used.

Issues to Consider

1. Natural and man-made catastrophes (Priority item 1)
2. The interest rate for the investment income credit has remained at 5 percent even though the available yields have decreased over time and are currently at all-time lows. (Priority item 3)
3. The risk charges are not calibrated to a transparent risk level. (Priority item 5).
4. Is the treatment of risk related to unearned premium appropriate?
5. The method of calibrating the factors is not completely transparent.
6. Is dependency between lines of business adequately considered?
7. Is the 70 percent rule an appropriate way to measure diversification?
8. The interest rate for investment income credit does not vary based on the duration of the claim payments, even though the yield curve means returns are larger for longer-duration liabilities than for shorter-duration liabilities.
9. Should the interest rate be based on a stochastic model?
10. Are the adjustments for loss-sensitive contracts appropriate?
11. Do the charges properly consider risks from unusual causes that are not well-represented in past history, such as:
    a. Risks that are observed but not necessarily considered adequately in calibration for the future – asbestos and pollution claims, construction defect claims, etc.

b. Risks that are not observed yet (emerging risks) – climate change, nanotechnology, etc.

12. Related to the above – is the risk of liability "catastrophes" sufficiently considered?
13. Related to the above – to what extent should the RBC formula consider the risk of new types of claims not reflected in past data?
14. Line of business concentration – do factors apply equally well to companies that are diversified across multiple lines of business as they do to companies with few or even one line of business?
15. Regional concentration – do factors apply equally well to companies that are diversified across regions as they do to companies that are diversified across geography?
16. Risk of unexpected underwriting losses from mandatory or voluntary pool participation – residual market arrangements, property catastrophe arrangements, nuclear pools, guarantee funds, etc.
17. Should the premium factors be adjusted to reflect the position in the underwriting cycle?
18. Is the 50/50 treatment of company and industry loss ratios appropriate?
19. Risk that regulatory constraints would restrict rate changes or underwriting criteria modifications
20. Company size is not reflected, but smaller companies may have greater relative loss ratio variability (law of large numbers).
21. As the RBC formula relies primarily on NAIC Annual Statement lines of business, risk differences for categories within Annual Statement lines of business may not be sufficiently reflected. For example, the risk factors are the same for D&O policies, lawyers' professional liability policies, and liability policies for both small and large retail businesses. Does this obscure significant risk differences?[27]
22. Should the risk factors be higher for new companies and companies with new lines of business or operations in new geographic areas?[28]
23. Rate adequacy is a major risk factor, but it is reflected based on historical variability rather than more directly for the historical or current company position. Is there a better way to reflect this risk?

[27] Some portion of the difference would be reflected by the adjustment for individual company experiences.

[28] Some portion of the difference might be reflected in the growth charge.

G. Other Issues

This section identifies issues that do not readily fit within any of the individual risk categories.

i. Dependency and Other Structural Issues

The combined P/C RBC is the result of the covariance formula

RBC = R0´ + square root $[(R1´)^2 + (R2´)^2 + (R3´)^2 + (R4´)^2 + (R5´)^2]$

Where:

R0´=R0 less the portions of R0 that are included in R1´ and R2´

R1´= R1 + R0 for fixed income investments of non-insurance affiliates

R2´=R2 + R0 for equity investments of non-insurance affiliates

R3´= (R3)/2

R4´=R4+ (R3)/2

R5´=R5

The issues with respect to this formula and dependency generally include the following:

a. Does this properly express the dependency among the risk elements?
b. Is dependency within each risk element properly handled?
c. The risk level and time horizons should be consistent across the different risk elements.
d. The risk level and related risk factors might be derived from scenarios that could better describe the relationship among the risks and therefore better describe the dependency structure.

ii. Other Possible Risk Areas

e. Operational risk[29]
f. Interest rate risk not otherwise considered
g. Liquidity risk
h. Currency risk
i. Hyper-inflation/deflation and their effect on both assets and liabilities
j. Extreme events or other risks not otherwise considered

[29] **Operational risk** in this context might be defined as the risk of loss not otherwise considered resulting from inadequate or failed internal processes, people and systems, or from external events.

iii. When the Company is not Average

The RBC calibration, by its nature, largely selects factors appropriate for an average company.

k. Should there be additional risk charges, with adjustments for possible double counting with factors already considered in the RBC formula (points up or down for a basket of possible variations from "average"), for factors like those identified in the NAIC Financial Analysis Solvency Tools system:

- Changes within a company: growth in combined ratio, reduced liquidity, growth in agents' balances, growth in expenses, growth in ratio of affiliate investment to surplus;
- Higher than average ratios: affiliate receivables to surplus, miscellaneous receivables to surplus, non-investment grade assets to surplus, other assets to surplus, cash outflow, high expense ratio, concentration in sources of business.

l. Should the risk factor be adjusted if the company has specific risk mitigation plans in place if assets fall below a certain threshold?

m. Should individual company stress and scenario tests be used to evaluate the adequacy of RBC factors and/or allow the use of alternative factors?

iv. Capital

n. Is the nature of the capital structure considered adequately?

o. Should a differential in capital-raising ability between stock and mutual companies be considered?