



AMERICAN ACADEMY *of* ACTUARIES

March 29, 2013

Via email to: nicole.elliott@tdi.texas.gov

Via email to: eyeung@naic.org

Nicole Elliott

Chair, Property/Casualty Risk-Based Capital Working Group
Capital Adequacy (E) Task Force

c/o Eva Yeung, Senior Insurance Reporting Analyst
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Re: Report on Reinsurance Credit Risk Charge in the NAIC Property/Casualty Risk-Based Capital

Dear Nicole:

The Property/Casualty (P/C) Risk-Based Capital Committee of the American Academy of Actuaries¹ is pleased to provide you with the attached report in response to the National Association of Insurance Commissioners' (NAIC) request to assist in the analysis of reinsurance credit risk in the context of the P/C Risk-Based Capital.

The purpose of the report is to provide an overview of the reinsurance credit risk charge in the calculation of the NAIC Property/Casualty (P/C) Risk-Based Capital (RBC), present a framework for addressing the current questions, and identify the issues that may need to be addressed to determine whether the current charge is appropriate and whether there are better ways to quantify the risks associated with reinsurance transactions.

The report is not intended to offer a specific proposal for an improved calculation of the reinsurance credit risk charge. Rather, its intent is to provide insight and analysis surrounding the issues involved in developing any proposal around the reinsurance charge.

We are looking forward to discussing the attached report and will be happy to provide additional information at your request. If you have any questions, please feel free to contact Lauren Pachman, the Academy's casualty policy analyst, at pachman@actuary.org.

¹ The American Academy of Actuaries is a 17,000-member professional association whose mission is to serve the public and 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.

Sincerely,

Alex Krutov, FCAS, MAAA, ASA, CERA
Chairperson, P/C Risk-Based Capital Committee
American Academy of Actuaries

cc: Ron Dahlquist, Chair, NAIC RBC Catastrophe Risk Charge Subgroup
Ted Nickel, Chair, NAIC Capital Adequacy Task Force
Alan Seeley, Chair, NAIC Solvency Modernization Initiative RBC Subgroup
Vincent Laurenzano

Attachment



AMERICAN ACADEMY of ACTUARIES

Report on Reinsurance Credit Risk Charge in the NAIC Property/Casualty Risk-Based Capital

April 2013

**Property/Casualty Risk-Based Capital Committee
American Academy of Actuaries**

The primary contributors to this report, listed in alphabetical order, are Neil Bodoff, Joe Cofield, Bob Eramo, Shiwen Jiang, Allan Kaufman and Alex Krutov.

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Reinsurance Credit Risk Charge in NAIC Property/Casualty Risk-Based Capital

1. PURPOSE

The purpose of this report is to provide an overview of the “reinsurance credit risk” charge in the calculation of the NAIC Property/Casualty (P/C) Risk-Based Capital (RBC), present a framework for addressing the current questions, and identify the issues that may need to be addressed to determine whether the current charge is appropriate and whether there are better ways to quantify the risks associated with reinsurance transactions.

While questions about the reinsurance credit risk charge have arisen in the past, recent discussions regarding the introduction of separate natural catastrophe risk elements in the NAIC’s risk-based capital (RBC) formula, changes in the treatment of reinsurance recoverable from some non-U.S. reinsurers, increased focus on the collateral provided to mitigate the risk of reinsurance uncollectability, and the NAIC Solvency Modernization Initiative (SMI) generally have increased the attention directed at the reinsurance credit risk charge in the NAIC’s risk-based capital framework.

We use the term “reinsurance credit risk” to describe the risks generally intended to be covered by the reinsurance recoverables portion of RBC described on page PR011 of the NAIC P/C RBC Report, “Credit Risk for Receivables.”² The reinsurance credit risk is usually the largest recoverable amount determined on RBC page PR011.

This report will discuss the following topics:

- Reasons for the adoption of the reinsurance credit risk charge in the current NAIC P/C RBC formula and assess their relevance today
- Components of the reinsurance credit risk charge and the rationale for their inclusion
- Ways in which each of the individual components of the charge can be quantified
- Extent to which the total risk can be seen as the sum of its individual components without any overlap or inter-correlation, or whether a lower amount would be more appropriate to reflect less than complete correlation
- Use of other exposure bases instead of or in addition to ceded balances for measuring reinsurance credit risk
- Any other issues to be addressed and questions to be answered in the review of the reinsurance credit risk charge

² NAIC Property and Casualty Risk-Based Capital Report Including Overview and Instructions for Companies as of December 31, 2012, National Association of Insurance Commissioners, 2012.

This report is not intended to offer a specific proposal for an improved calculation of the reinsurance credit risk charge. Rather, its intent is to provide insight and analysis surrounding the issues involved in developing any proposal around the reinsurance charge.

This report does not provide details of the NAIC RBC formula that can be found elsewhere.^{3,4}

³ 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.

⁴ NAIC Property and Casualty Risk-Based Capital Report Including Overview and Instructions for Companies as of December 31, 2012, National Association of Insurance Commissioners, 2012.

2. BACKGROUND

The NAIC Property/Casualty RBC formula was adopted in 1994.

Main Risk Categories in the Current NAIC P/C RBC Formula

The U.S. P/C RBC formula has six main risk categories and six corresponding capital charges, known as $R_0 - R_5$, where:

R_0 is Affiliated Insurance Company Assets RBC,

R_1 is Fixed Income Assets RBC,

R_2 is Equity Assets RBC,

R_3 is Credit-Related Assets RBC,

R_4 is Underwriting Risk - Reserves RBC, and

R_5 is Underwriting Risk - Net Written Premiums

Reinsurance Credit Risk—Components and Charges

The total “Credit Risk for Receivables” charge in the formula includes:⁵

- reinsurance recoverables net of any Schedule F “penalties” times 10 percent
- guaranty funds receivable or on deposit times five percent
- interest, dividends, and real estate income due and accrued times one percent
- receivables from parent, subsidiaries, and affiliates times five percent
- amounts receivable relating to uninsured accident & health plans times five percent
- aggregate write-ins for other than invested assets times five percent

This report will focus on the first component of the credit risk for receivables, specifically, the reinsurance credit risk. All the other components, as well as the health credit risk component, are included directly in the R_3 charge.

Ceded reinsurance affects surplus and RBC charges in the context of Statutory Accounting and the NAIC RBC rules in three ways. For recoverables from U.S. affiliates and mandatory pools, no reinsurance credit risk charge is applied, and surplus fully reflects the ceded amount. For authorized reinsurers, certified reinsurers providing sufficient collateral,⁶ and collateralized unauthorized reinsurance balances, surplus fully reflects the ceded amount, but the 10 percent reinsurance credit risk charge is applied to the ceded balances. Where credit for reinsurance is

⁵ NAIC Property and Casualty Risk-Based Capital Report Including Overview and Instructions for Companies as of December 31, 2012, National Association of Insurance Commissioners, 2012.

⁶ A detailed description can be found in the NAIC Credit for Reinsurance Model Law and Credit for Reinsurance Model Regulation, revised in November 2011.

not allowed, surplus is reduced to offset the ceded amounts, and no reinsurance credit risk charge is applied.

The 10 percent capital charge applied to reinsurance recoverables is generally the largest component of the total credit risk for receivables charge in form PR011.

Reinsurance Credit Risk and the Covariance Adjustment in the Current NAIC P/C RBC Formula

The total reinsurance credit risk charge, calculated as described above, is then allocated as follows:

- 50 percent is included in the R_3 charge and
- 50 percent is included in the R_4 - underwriting risk (reserves RBC) charge.

This 50 percent allocation to R_4 applies only if, as is usually the case, the PR011 Credit Risk for Receivables is less than the Total Adjusted Unpaid Loss and Loss Expense Reserve RBC portion of R_4 (PR029, line 63). Otherwise, all of the reinsurance credit risk charge is included in R_3 .⁷

In calculating the total amount of RBC, the square root rule, also referred to as the covariance adjustment, is used to account for the fact that the RBC amounts for the individual R_i components, when simply added together, overstate the true risk.

The combined RBC is calculated based on the following formula:

$$RBC = R_0 + \sqrt{R_1^2 + R_2^2 + R_3^2 + R_4^2 + R_5^2}$$

Since both R_3 and R_4 are subject to the square root rule, the reinsurance credit risk charge has less of an impact than if it were a stand-alone charge. Generally, the largest effect of the reinsurance credit risk charge arises from the portion allocated to R_4 rather than to the portion allocated to R_3 . The allocation of 50 percent of the reinsurance credit risk charge to the underwriting risk (reserves RBC) charge is not the same as a “50 percent correlation.”

Key Observations

- The two key determinants of the reinsurance credit risk charge are the ceded balances and the 10 percent risk charge.
- We recognize that the basis for the reinsurance credit risk charge is ceded balances because those values are readily available in the Annual Statement.

⁷ NAIC Property and Casualty Risk-Based Capital Report Including Overview and Instructions for Companies as of December 31, 2012, National Association of Insurance Commissioners, 2012.

- We also understand that, when the NAIC RBC formula was adopted, the selection of the 10 percent risk charge reflected expert opinion at the time and that a number of policy considerations played into that decision, including those outlined in Appendix 1.
- Appendix 2 provides data showing the extent to which the reinsurance credit risk component affects total RBC by company size.

Changes Affecting Reinsurance Risk Since Development of RBC Formula

Since the NAIC's RBC framework was introduced, a number of new controls on reinsurance risk have been implemented, each of which has a potential impact on the size of the reinsurance credit risk.

1. In the Statement of Actuarial Opinion, the opining actuary now attests to both the gross and net reserves of the company.
2. Consistent with the increasing emphasis on corporate governance, companies are expected to have greater internal controls over their operations, including the nature and use of reinsurance.
3. More testing and documentation is required in the realm of risk transfer. As such, there is more formal assurance that reinsurance arrangements include a sufficient degree of risk transfer, and there is more actuarial modeling of the effects of reinsurance transactions.

Also, in November 2011, the NAIC adopted amendments to its Credit for Reinsurance Model Act and Credit for Reinsurance Model Regulation. These amendments allow ceding insurers to receive credit for reinsurance ceded to certified reinsurers, to the extent that the required partial collateral is posted (discussed further in the "Collateral" section below).

The NAIC is in the testing phase of a specific proposal to introduce two new categories, R₆ and R₇, to reflect the risks posed by earthquakes and hurricanes, respectively. This proposal provides for an additional capital charge to account for the risk that catastrophe reinsurance may be, in part, uncollectible.

This proposal would convert R₅ calculations to an excluding catastrophes basis. R₆ and R₇ would then reflect a "modeled" net catastrophe loss (1-in-100 year annual aggregate⁸), plus a reinsurance credit risk charge factor times the expected reinsurance recoverables, subject to risk charges for the 1-in-100 year annual aggregate. This factor may not be the same as the factor applied to reinsurance recoverables in the calculation of the reinsurance credit risk charge.

These proposed changes will need to be considered in any revision to the formula.

⁸ The NAIC has not made a final decision regarding the proper calibration level of this risk.

3. COMPONENTS OF REINSURANCE CREDIT RISK

The reinsurance credit risk charge should include, to the extent practical, all risks related to reinsurance transactions that are not otherwise considered in the RBC formula. This principle is generally consistent with the reinsurance credit risk charge's intent and original formulation, as detailed in Appendix 1.

The elements of the reinsurance credit risk, consistent with the scope provided, can be defined as listed below. The order in which the components are listed does not necessarily correspond to the degree of their relative importance.

A. Reinsurance Recovery Risk

The reinsurance recovery risk is the risk that the ceding insurer will be unable to collect the full amount of reinsurance recoverables. This risk arises primarily from three scenarios:

- (1) **Counterparty default risk** – the ceding company's inability to collect the full amount of reinsurance recoverables anticipated under the contract terms due to reinsurer default(s).
- (2) **Commutation risk** – the ceding insurer mitigating its credit risk by accepting a reinsurance commutation for an amount less than that anticipated to be recoverable under the contract due to deterioration in the financial condition (but not actual default) of the reinsurer.⁹
- (3) **Coverage dispute risk** – a reinsurer is able to pay the full amount expected by the ceding insurer, but the reinsurer successfully disputes the applicability of reinsurance coverage and/or the actual amount to be paid.

There may also be other ways to delineate these risks that achieve a similar framework.

B. Other Increases in Risk Related to Reinsurance Transactions

The measurement of the company's risk net of reinsurance may be affected by reinsurance transactions, leading to the following additional components of risk, arising in part because of the way the R₃ charge and premium and reserve underwriting risk charges are determined:

- (4) **Extent of risk transfer** – the extent to which the **net** risk charge is understated because reinsurance cessions do not transfer as much risk as reflected in the “industry average” premium and reserve underwriting risk charges.
- (5) **Extent of reinsurance use** – the extent to which higher than “average” reinsurance usage is a solvency risk factor, as indicated by practical experience and supported by recent statistical analysis (see Appendix 3).¹⁰

⁹ There is a connection between Component 1 and Component 2 in that an insurer might commute, fully or in part, prior to default. For purposes of this report, we treat commutation prior to default within Component 1, the counterparty default risk component. Component 2 then includes only commutations entered into on the basis of increased risk of reinsurer default, where the default does not actually happen.

Components 1-3 represent risks related to failure to collect the full value of reinsurance anticipated by the insurer. Components 4-5 relate to the measurement of risk, net of reinsurance, as that is affected by the nature and scope of reinsurance transactions. AM Best identifies “Reinsurance Failure” as the primary cause of 3.6 percent of all 1996-2010 insurance company impairments, but “Reinsurance Failure,” as defined by AM Best, relates to Component 1 alone.¹¹ With possible exceptions, Components 2-5 would be identified as “Other Causes of Failure” in that study. There have also been instances where reinsurance failure contributes significantly to insurance company impairment.

At least in theory, there might be some limited overlap among the risks reflected in the underwriting risk charges as currently calculated and Components 4 and 5 identified above.

¹⁰ Marchena, Eduardo, Allan Kaufman and Ji Yao, A Review of Historical Insurance Company Impairments, Report 4 of the Casualty Actuarial Society (CAS) Risk Based Capital (RBC) Research Working Parties Issued by the RBC Dependencies and Calibration Working Party (DCWP), Casualty Actuarial Society E-Forum, Fall 2012-Volume 2, <http://www.casact.org/pubs/forum/12fforumpt2/RBC-DCWPRpt4.pdf>.

¹¹ A.M. Best Company, Inc., Best’s Special Report, *1996-2010 P/C Impairment Review*, May 2, 2011, Exhibit 4 page 4.

4. QUANTIFICATION OF REINSURANCE CREDIT RISK - KEY POINTS

In this section, we discuss important features that affect the quantification of the components. The next section discusses the quantification of each risk individually.

1. Business Environment

Quantification of the reinsurance credit risk should reflect the probability and magnitude of potential loss in “stressed” financial conditions for both the ceding company and the assuming reinsurer. Stressed financial conditions include but are not limited to adverse position of financial markets, negative effects of underwriting cycles, and catastrophe events.

a. Probabilities

Probabilities of reinsurer default (Component 1), commutations arising from financial deterioration of the assuming company (Component 2), and, to some degree, dispute risk (Component 3) should be evaluated in stressed financial circumstances for both the ceding and assuming companies.

The average historical rate of reinsurer defaults is likely to be significantly lower than the default rate in stress scenarios that are more relevant for RBC purposes.

b. Magnitude

The credit amount at risk should be evaluated in stressed conditions with respect to adverse development on reserves, the occurrence of catastrophe events, and other potentially adverse loss ratio events.

Stress scenarios could include natural catastrophe events or adverse development in ceded reserves. In many cases, it will be useful in this report to think of the relationship between ceded balances in stress scenarios and ceded balances in the Annual Statement as a ratio we call the “Exposure Factor.”

2. Time Horizon

a. Exposure to new events

Time horizon includes (a) the events related to run-off of unearned premium reserve, and (b) the events associated with one additional year of written premium.

b. Exposure to claim payments

Time horizon includes the multi-year horizon of claim payments.

3. Correlation and Diversification

The RBC formula recognizes that there is correlation between R_3 risk on ceded reserves and R_4 reserve risk. This is recognized in the current formula, in which 50 percent of the reinsurance credit risk charge is included in R_3 , and the remainder is included in R_4 .¹² However, to our knowledge, that allocation was based on judgment and is not supported by close analysis.

There are other correlations that affect reinsurance credit risk, including the following:

- Default risk and commutation risk are highly correlated (Components 1 and 2 of reinsurance credit risk)
- Components 4 and 5 are correlated with adverse loss development, as reflected in R_4
- Components 4 and 5 are correlated with adverse underwriting results, as reflected in R_5
- Dispute risk (Component 3) is correlated with adverse loss experience (R_4 and R_5)
- Counterparty default risk (Component 1) and commutation risk (Component 2) are correlated with adverse loss experience (R_4 and R_5)

4. Reinsurer Diversification

Multiple reinsurers provide some diversification benefit, although that diversification effect is partially offset by systemic risks, particularly catastrophes and industry-wide liability events, that affect multiple reinsurers.

5. Type of Reinsurance

The quantification of the risk components depends on the type of reinsurance, e.g., quota share or excess of loss, or catastrophe aggregate excess of loss, relative to the Exposure Factor, time horizon, and correlation issues.

a. Exposure Factor Effects

The “Exposure Factor” defined in 1b above varies by type of reinsurance.

In general, the Exposure Factor is the smallest for quota share reinsurance. For quota share reinsurance, the magnitude of the Exposure Factor is similar to the size of the reserve risk charge,¹³ which varies from 10 percent to nearly 90 percent, depending on line of business.

The Exposure Factor related to excess reinsurance would typically be larger than for quota share reinsurance, as the variability in ceded excess claims is higher than the variability in ceded ground up claims.

Finally, of the various types of reinsurance, the Exposure Factor tends to be largest for catastrophe reinsurance, in which the current risk base is unearned premium, but catastrophe

¹² As indicated above, under certain conditions, none of R_3 is included in the underwriting risk charge for reserves.

¹³ Before Investment Income Offset and excluding the under-five percent risk charges on Financial and Warranty coverages.

claims, when they occur, are expected to be 10, 20, or 100 times larger than the balance sheet ceded unearned premium. Once R_6 and R_7 are introduced into RBC, the actual “modeled” 1-in-100 year annual aggregate losses can be used directly in the RBC calculations.¹⁴

b. Time Horizon

The relevant time horizon will be shorter for catastrophe reinsurance than for liability quota share or excess reinsurance. Once R_6 and R_7 are introduced into the RBC formula, the shorter time horizon for catastrophe risk will be reflected in the R_6/R_7 reinsurance credit risk factors, and the longer time horizon will be reflected in the remaining non-catastrophe-reinsurance credit risk charge.

c. Correlation

Dependencies between and among reinsurance credit risk components and other elements of RBC depend on the type of reinsurance involved. Reinsurance credit risk on catastrophe reinsurance might closely correspond to premium risk (adverse loss ratios), for instance, but correspond less closely to reserve risk (adverse loss development). Once R_6 and R_7 are introduced into the RBC formula, there may be increased correlation between the non-catastrophe reinsurance credit risk and reserve risk, R_4 . The reinsurance credit risk on quota share or excess liability reinsurance contracts, on the other hand, might be highly correlated with reserve risk.

6. Reinsurance with Affiliates and Industry Pools

a. Reinsurance with Affiliates

The reinsurance credit risk associated with reinsurance with affiliates is different from reinsurance credit risk associated with third parties. Components 1 through 5 should be assessed separately for third party reinsurance and for reinsurance placed with affiliates.

b. Reinsurance with Industry Pools

The extent of reinsurance credit risk associated with cessions to industry pools is different from reinsurance with third parties. Components 1 through 5 may need to be assessed separately for third party reinsurance and for reinsurance with cessions to industry pools.

7. Risk Metric

While it is beyond the scope of this report to propose a specific risk metric (risk measure) to use in capital charge quantification, consideration should be given to the potential for inconsistent risk charges for different risks arising from the use of different metrics.

For example, the premium and reserve risk charges within the RBC formula are generally interpreted to be the amounts needed to cover adverse loss development or adverse loss ratios up

¹⁴ The NAIC may calibrate the charges to a level other than the currently-proposed 1-in-100 year level or may choose a different risk metric altogether for these capital charges.

to a selected safety level,¹⁵ sometimes referred to as a Value at Risk (VaR) approach. Conversely, the use of VaR might be viewed by some as problematic for the reinsurance credit risk given the nature of the reinsurance credit risk arising more in the “tail” of the distribution (Tail VaR). Combining some RBC charges based on VaR with other RBC charges based on other risk metrics might lead to inconsistency in the RBC calculations.

8. Limits on Precision

Efforts to be precise in the formulation of the reinsurance credit risk charge should be weighed against the potential for any “standard” formula or factor to misstate the impact of reinsurance credit risk on an individual company. The reasons for this include the following:

- a. Reinsurance is often tailored to individual company situations; as a result, the effect of reinsurance on a company risk profile is often more insurer-specific than is the case for the other risks in RBC. Therefore, regardless of what approach is adopted, there may be important simplifications to consider relative to any individual company situation.
- b. The RBC formula is a “standard” formula in which RBC for all companies is based, with some adjustments, on the same “industry average” factors. In reality, the risks may vary widely by company.

9. Practical Limitations

While the principle underlying the selection of reinsurance credit risk components in this report proposes that all relevant aspects of the risk be considered, as a practical matter, some issues may not be considered.

For example, reinsurer default might result in extra costs, like the need to buy replacement coverage at a higher cost than the original coverage. It might be determined that reflection of these and other costs in RBC is not practical and/or not necessary. The list of components provided here is intended to identify those that are most significant.

¹⁵ While generally accurate, this interpretation involves several simplifying assumptions, and it could be argued that the calibration corresponds to a higher percentile.

5. ANALYSIS OF REINSURANCE CREDIT RISK COMPONENTS

In the sections above, we have identified the main components and key issues essential to assessing the reinsurance credit risk in the NAIC P/C Risk-Based Capital formula. Below, we (a) describe each of these components and (b) discuss issues involved in quantifying the risk associated with each of them.

COMPONENT 1: Reinsurance Counterparty Default Risk

Description

The reinsurance counterparty default credit risk is the credit risk associated with an inability to collect the full amount of reinsurance recoverables anticipated by the ceding company under the contract due to the default of one or more reinsurance companies.

Quantification

The following factors are used in analyzing this risk (all measured in stressed conditions):

Probability

- Probability of default of one or more reinsurers

Magnitude of Loss

- The ceded balances in stress scenarios, e.g., the amount at risk, gross of recoveries from the reinsurer's estate
- The extent of recoverables from a defaulting reinsurer through the reinsurer's estate or collateral

Diversification/Concentration Issues

- Diversification of risk with multiple reinsurers
- Correlation between probability of loss and size of loss
- Correlation with R_4 and R_5

We discuss these factors below. As a preface to that discussion, however, we note first that, if there were enough experience data, quantification of counterparty default risk could be based on insurance company insolvency experience. However, insurance industry default experience varies widely over time, e.g., default rates were high in the 1980s but much lower in recent decades, suggesting that there is not enough experience data to provide a stand-alone basis for the quantification of default risk. As such, quantification is more often based on components drawn from a wider experience base of business failures.

Second, the components can be assessed by considering a “standard reinsurer,” which produces risk charges that do not vary based on the characteristics of the actual reinsurer. In either case, the same concepts apply.

Probability of default

The default rate for a “standard insurer” or an individual insurer could be based on claims-paying ability ratings assigned by rating agencies as a common measure of the probability of default or the effect of such default. The claims-paying ability ratings are more relevant here than the traditional credit ratings also assigned to reinsurance companies.

The RBC time horizon covers future events for one year, plus the run-off of existing liabilities. As such, we are interested in defaults that may occur several years into the future.

Loss Given Default (LGD)

The gross exposure is the ceded amount unpaid before recovery from the reinsurer’s estate or special protection like collateral. The net LGD is the ceded amount unpaid after recovery from the reinsurer’s estate or special protection like collateral. Special issues regarding collateral are discussed in Section 6.

The ceded balances in the Annual Statement at the prior financial statement date may not be the gross exposure for reinsurance credit risk, as ceded balances may be larger at the time of reinsurer default.

For example, consider catastrophe reinsurance. The only ceded balances prior to the event are ceded unearned premium reserves. If the reinsurer then defaults when the catastrophe occurs during the ensuing year, the ceding company has a significant ceded unpaid claim balance subject to default risk.

For quota share, excess, or other types of reinsurance, the ceding insurer may experience adverse loss development at the same time the reinsurer experiences financial difficulty. In that case, the gross exposure will also be larger than the ceded balances reported in the prior year-end Annual Statement.

The recovery could be set at an amount based on expert opinion (such as 50 percent), or, if possible, it could be based on some historical data regarding recovery rates from defaulted reinsurers.

Diversification among reinsurers

On the one hand, diversification by reinsurer reduces the risk and may warrant a reduction in the associated risk charge, as the defaults of reinsurance companies are not perfectly correlated.

Diversification among reinsurers could increase the probability of a default affecting reinsurance recoverables simply because there are more reinsurers involved. However, diversification could

decrease the effect of the default, in that an insolvency of one of several reinsurers would affect only a portion of the total ceded reinsurance risk.

Also, reinsurer defaults could be correlated due to market-wide events like the negative effects of underwriting cycles and catastrophe events, including events that result in the failure of a large catastrophe retrocessional reinsurer.

COMPONENT 2: Commutation Risk

Description

Commutation risk is the risk associated with a ceding insurer mitigating its reinsurance collectability risk by accepting a reinsurance commutation for an amount less than that recoverable under the contract terms, due to a deterioration in the reinsurer's financial condition but not actual default.

Counterparty default risk (Component 1) treats default as a binary event in which the reinsurer will default with probability A percent, based on the relevant probability distribution, causing a loss of X dollars, with an expected recovery rate of C percent.

Commutation risk (Component 2) reflects the possibility of loss due to commutation for less than full value, in response to the deteriorating financial condition of the reinsurer, even though the reinsurer does not default.

For purposes of this report, we have defined Components 1 and 2 so as to avoid the potential for overlap between the two, to the extent that a company commutes with a reinsurer that subsequently defaults. As defined above, then, Component 1, rather than Component 2, applies to a company that defaults subsequent to a commutation.

Quantification

This is not an area of risk in which actual loss experience is compiled. Moreover, there is no direct financial market information to use in quantification. As such, quantification would require the use of expert judgment, generally reflecting experience with insolvencies and financial examinations of insurers.

In the context of the main categories used for counterparty default risk, our observations are discussed below.

In the future, it is possible that reliable data sources related to historical commutation settlements might provide some insight into adjusted default probability values for reinsurers with various ratings. We know of no such data sets currently available.

Probability

A reasonable starting point for this quantification would be rating transition matrices, which provide the probability of deterioration in a reinsurer's claims-paying ability. Commutation risk could arise as a result of a downgrade to a selected level (e.g., falling below A-). Systemic risk should be reflected.

The probability of "forced" commutations of this type is also affected by collateral and/or contract terms that may call for an increase in collateral or provide other protection to the ceding company from a downgrade in reinsurer ratings below a certain level.

Magnitude

The magnitude of loss, net of commutation recovery, could be based on the same principles as, but with smaller losses than, Component 1 in insolvency.

COMPONENT 3: Reinsurance Dispute Risk

Description

This component of reinsurance recovery risk reflects situations in which a reinsurer has the ability to pay the full amount expected by the ceding insurer, but the reinsurer successfully disputes the applicability of coverage and/or the actual amount to be paid.

Quantification

As with Component 2, and perhaps to an even greater extent, quantification would require the use of expert judgment more than the use of data-based calibration because of the likely limitations on the availability of data to support an analysis.

For example, during the course of a dispute, a portion of this amount may appear as "overdue reinsurance recoverable." Accumulation of this information might provide some insight as to the magnitude of this risk. However, disputes concerning large claims that could lead to insolvency generally differ from more routine disputes involving smaller claims. Furthermore, experience over the past several decades would be heavily influenced by the effects of resolving asbestos and pollution claims. That asbestos and pollution experience illustrates one possible scenario of the effects of a mega-event, but any such future events may or may not evolve in a similar way.

Another example is the reinsurance disputes associated with workers' compensation insurance that are often mentioned as having contributed to high-profile insurance company insolvencies. However, reinsurance coverage dispute risk is not limited to specific lines of business.

In addition, data may be limited because this is an area in which some companies may tend to avoid public discussion of losses. Moreover, there is limited direct financial market

information to use in quantification, and some companies may be reluctant to publicly disclose even the existence of some reinsurance-related disputes.

The potential negative consequences of an inability to collect reinsurance recoverables in a timely manner relate to coverage disputes as well as to some other types of risk. In such cases, liquidity risk may not be adequately reflected in the RBC ratio.

COMPONENT 4: Extent of Risk Transfer

Description

This component of the reinsurance credit risk reflects the extent to which the net risk charges R_4 and R_5 are understated because reinsurance cessions do not transfer as much risk as assumed by net premium or reserve risk charges, R_4 and R_5 .

The RBC net underwriting risk charges, R_4 and R_5 , are calculated as (a) reserves net of reinsurance and premiums net of reinsurance multiplied by (b) risk charges. The risk charges are calibrated with industry premium and reserve data net of reinsurance. Developed in this way, the net risk charge implicitly assumes that ceded premiums and ceded reserves reduce the retained risk for each insurer by the same “average” amount as the industry.

To the extent that the individual insurer risk transfer per dollar of ceded premium/reserve is less than the industry “average” amount, the net risk remaining with the ceding insurer is greater than anticipated by the net reserve and net premium risk charges R_4 and R_5 . This additional retained risk should be reflected in the individual insurer RBC.¹⁶

There are generic and insurer-specific reasons that the extent of risk transfer differs among insurers.

Generic differences among insurers relate to the types of reinsurance used by the insurer. The degree of risk transfer per dollar of ceded premium or ceded reserve differs among proportional (usually lowest) and non-proportional (usually higher) reinsurance, with catastrophe (typically the highest) reinsurance often deviating most from the other types. The reinsurance credit risk R_4 and R_5 charges do not distinguish among various types of reinsurance. As such, the total charge is likely to accurately reflect the associated risk only if the insurer has the typical mix of types of reinsurance. Insurers with primarily quota share reinsurance may receive too much RBC credit for reinsurance. Insurers with only excess reinsurance may receive too little net credit for reinsurance.

¹⁶ The possibility of “additional retained risk” relates to premium risk for any line of business with reinsurance. While the possibility of “additional retained risk” affects reserve risk for all lines, in practice, it is likely to be important only for longer-tailed lines.

Second, reinsurance programs differ based on insurer. Programs may feature limits on aggregate ceded amounts or aggregated ceded loss ratios,¹⁷ high ceded premium relative to ceded losses offset through commission adjustments, swing-rated premiums,¹⁸ and the like. These features affect the amount of risk transfer per dollar of ceded premium compared to the “typical program.” Over the past several decades, increased regulatory attention to risk transfer in reinsurance contracts has eliminated the more radical means of limiting risk transfer, but the extent of risk transfer and the relationship between risk transfer and ceded premium will still vary among insurers. The particular company risk profile can only be assessed through individual company modeling of the effect of its particular reinsurance program(s). Insurers will be doing that modeling with respect to catastrophe risks under the new NAIC treatment of catastrophe risk. We know of no current NAIC plans to have companies model the impact of their specific quota share or excess reinsurance programs.

Quantification

Quantification at a detailed level is not possible without insurer-specific modeling and a determination of the extent of risk retention assumed by the net premium and reserve risk charges. These were not considered practical in the early 1990s when the RBC formula was established. As such, one criterion for the reinsurance credit risk charge was that it should be set so as to minimize the chance that the charge would create improper incentives affecting the use of reinsurance.

Detailed modeling and a determination of the “typical risk transfer” may still not be considered practical or appropriate for a standard formula like RBC. Nonetheless, the RBC formula could be made more sensitive to individual company risk differences by:

1. Varying the risk transfer component of the reinsurance credit risk based on the degree to which ceded reinsurance for the company varies from the average level by line of business/size of company, with zero charge for companies with less than “average” cessions and charges increasing as the cessions increasingly exceed the “average.”
2. Applying the risk transfer component to the reinsurance credit risk charge separately by line of business,¹⁹ so that the relative size of the reinsurance credit risk charge vs. the net risk charge can be established more consistently by line of business.

¹⁷ Risk of loss above the aggregate is transferred back to the ceding company, making risk transfer contracts with lower aggregate limits less effective, per dollar of ceded premium, than risk transfer contracts with higher aggregate limits or without aggregate limits.

¹⁸ Ceded premium is increased, so net premium or reserves are reduced, and R₄ and R₅ RBC charges are reduced, but risk remains with the ceding company through premium or commission adjustments.

¹⁹ The data required to implement this change, ceded balances excluding pools and reinsurance with affiliates, are not now segregated by line of business in the Annual Statement or RBC filing. Such data is typically available within the insurer, however, because total reinsurance balances are allocated by line of business. Moreover, total ceded balances compared to ceded balances related to pools and affiliates might be a suitable proxy.

3. Separately identifying the amounts of proportional and non-proportional reinsurance, including catastrophe reinsurance not included in the R₆/R₇ risks.²⁰

Other approaches could also be used in the quantification of this risk component.

Enhancements of the types described above are more practical currently than they were in the early 1990s because the Schedule P detail for ceded reinsurance has been expanded, and greater financial reporting attention is being paid to reinsurance matters, including actuarial opinions on gross as well as net reserves.

Detailed analysis like this may be considered unnecessary in most cases, in which the ceded risk charge is small, but it might be appropriate, despite its increased complexity, for companies with higher than “average” levels of ceded reinsurance.

COMPONENT 5: Extent of Reinsurance Usage

Description

Reinsurance usage varies widely among insurers, and overuse of reinsurance was perceived as a risk when the original RBC formula was developed. This component reflects the extent to which higher than “average” reinsurance usage is a solvency risk factor, as indicated by practical experience and supported by statistical analysis.

Recent research suggests that reinsurance usage could potentially provide predictive value in assessing the likelihood of company financial difficulty. As described in Appendix 3, a study by the CAS analyzed historical insolvency rates for insurance companies based on the degree of their reinsurance usage. The ratio of ceded written premium to gross written premium was calculated, and, based on this ratio, the companies were placed in one of the following four categories: 0-25 percent, 25-50 percent, 50-75 percent, and 75-100 percent.²¹ The historical insolvency rate for companies in the first category was the lowest. Companies in the other categories, i.e., those with over 25 percent of their written premiums reinsured, had significantly higher historical insolvency rates.²²

Quantification

The research published to date does not reveal a specific method that would quantify the extent of the increase in risk related to the increase in the use of reinsurance. However, the RBC formula could be made more sensitive to individual company risk differences if this component

²⁰ This would require a new type of information for the Annual Statement or RBC filing.

²¹ See Appendix 3 for more detail on the study. In the calculations, the all-lines written premiums for 15 years were totaled by group, with affiliate reinsurance excluded. All companies in each group were then placed in a category based on the ratio of that group’s ceded written premium to its gross written premium.

²² The CAS is continuing its research on insurance insolvencies. Future research in this field may lead to greater understanding of the reasons for the apparent correlation between the degree of reinsurance usage and the insolvency rate observed in the historical data.

of the risk charge was based on the degree to which ceded reinsurance for the company deviates from the “average” level,²³ e.g., a table of “average” cessions by line of business/size of company, with zero charge for companies with less than “average” cessions and charges increasing as the cessions increasingly exceed the “average.” As mentioned above, recent research suggests that greater usage of reinsurance, above a certain threshold, may be indicative of greater insolvency risk.

This risk component may overlap with Component 4, so the effect on the total RBC charge might best consider the combined effect of Components 4 and 5 rather than their individual effects.

²³ Conceptually similar to the approach applied in the growth charge.

6. TREATMENT OF COLLATERAL

Collateral reduces the risk of reinsurance collectability and, in some cases, almost eliminates it. Ceding companies are permitted to take 100 percent credit for reinsurance recoverables from authorized reinsurers on their balance sheet. Reinsurance obligations of unauthorized reinsurers must be 100 percent collateralized for the ceding company to take balance sheet credit and not be subject to a Schedule F penalty.

In 2011, the NAIC introduced amendments to the Credit for Reinsurance Model Law and Credit for Reinsurance Model Regulation. The amendments provide reductions in collateral held by unauthorized reinsurers who apply for and become “certified” reinsurers. The application to become a “certified” reinsurer considers financial strength, reputational history, and other factors. The required amount of collateral will increase as the reinsurer moves from the top tier (“Secure-1”) to the lowest tier (“Vulnerable-6”) of security.

The NAIC is developing uniform rules and preparing a list of qualified jurisdictions to use in deciding whether to grant a company “certified” reinsurer status. However, the ultimate decision rests with an individual state. Furthermore, even among those states that do adopt the amendments and agree on a list of qualified jurisdictions, each state will have the authority to assign its own (potentially different) rating to the same certified reinsurer.

While a detailed discussion of collateral is beyond the scope of this report, some general considerations of the treatment of collateral in RBC are presented below.

1. Covering balance sheet recoverable amount does not eliminate the risk

Collateral is intended to reduce the magnitude of the loss given default and, to some degree, reduce delay in receiving recoveries.

The extent to which the collateral reduces the loss given default depends on whether the collateral covers only ceded balances or whether there is overcollateralization. For example, if collateral covers the balance sheet ceded recoverables, the actual recoverable might be larger if ceded claims were larger than recorded on the prior year’s balance sheet and were allowed for by the collateral.

2. Collateral does not address all risk components arising from reinsurance transaction

Collateral might reduce the credit risk exposure presented by the reinsurer (Component 1) and reduce potential losses due to forced commutation (Component 2). However, collateral is unlikely to reduce reinsurance risk arising from Components 3, 4, and 5; coverage disputes; extent of risk transfer; and extent of reinsurance use.

3. Credit or other collection risk associated with collateral and other loss mitigation strategies

RBC needs to reflect the nature of risks associated with the collateral, e.g., type of collateral, financial condition of the entity maintaining custody of the collateral instrument (letter of credit or trust fund), etc.

4. Unauthorized Reinsurance

Collateral for “unauthorized reinsurance” has historically served a number of purposes beyond the guarantee of payment in the event of default. The requirement for collateral reflects the uncertainties associated with the financial condition of companies beyond the scope of full regulatory scrutiny and the risk of delay in collections. Some of these uncertainties include the availability of financial statements for these reinsurers and whether these financial statements reasonably reflect the financial condition of the company. An additional consideration may be the presence of regulatory support to encourage the company to pay claims as due.

Prior to the 2011 NAIC amendments relating to reinsurance credit risk, ceding companies were only permitted to reflect credits to reinsurance recoverables from unauthorized reinsurers if the recoverables were 100 percent collateralized. The NAIC amendments now permit some ceding insurers to reflect credits to reinsurance recoverables from unauthorized reinsurers even if the recoverables are not 100 percent collateralized.

Issues Considered at the Time of RBC Adoption in 1994

1. **Reinsurer Default:**²⁴ Reinsurance defaults contributed to several major insurance company insolvencies in the mid-1980s. The most commonly cited insolvency at the time was Mission Insurance Company, which was an example of classic reinsurance credit risk.
2. **Ceding Company Reserve Adequacy:** Underestimation of ceded reserves or random fluctuation can each cause ceded balances to be lower than actual ceded amounts. To reflect this risk, the charge applied to the ceded balances was set at a higher (more conservative) level than might have been the case if the charge reflected only the reinsurer default risk.
3. **Coverage Dispute Risk:** Reinsurer default risk deals with counterparties unable to meet their financial obligations. Another important component of counterparty risk is the risk of coverage disputes resolved in favor of the reinsurer. Adjudication of the contract terms may result in the ceding company only recovering a portion of what is expected. To reflect this contingency, the charge applied to ceded balances was set at a higher level than might have been selected if the charge reflected only the reinsurer default risk.
4. **Risk Transfer:** Many reinsurance contracts do not contain full risk transfer. Some policies, with aggregate limits or loss ratio caps, result in additional premiums due to the reinsurer when there are significant losses. These limits on risk transfer are not fully reflected in the risk charges for net premium or net reserves. To reflect this contingency, the charge applied to ceded balances was set at a higher level than might have been selected if the charge reflected only the reinsurer default risk.
 - a. **Affiliates:** There were allegations that some financially troubled companies used questionable reinsurance transactions with affiliated companies to hide their financial problems.
 - b. **Incentives – Ceding Company Use of Reinsurance:** While overuse of reinsurance was perceived as a risk at the time of the RBC formula's introduction, another goal of the RBC formula was not to create inappropriate incentives or disincentives for using reinsurance.

²⁴ 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.

Reinsurance Credit Risk Charge Effect on Total RBC

Tables 1, 2, and 3 below show the extent to which the reinsurance credit risk charge affects the total RBC charge. These tables are based on 2010 data.²⁵

Table 1 shows reinsurance credit risk as a percentage of the total of R₀ to R₅, before covariance adjustments. For all companies combined, the reinsurance credit risk is less than 7 percent of the total RBC charge. However, this proportion varies by size of company. For the smallest 20 percent of companies (by asset size), the reinsurance credit risk constitutes over 25 percent of the RBC charge. For the largest 20 percent of companies, it is only 6 percent of the total RBC charge.

Table 1
Reinsurance Credit Risk as Percentage of Total RBC

A	B	C
Asset Size Percentile	Average Direct Premium (\$ millions)	Reinsurance Credit*
0-20%	12	26%
20-40%	31	13%
40-60%	64	17%
60-80%	157	17%
80-100%	640	6%
Grand Total		7%
* 100 percent of reinsurance credit risk before allocation to reserve risk		
Ratio to Company Action Level RBC before covariance adjustment		

Table 2 below shows the extent to which the 10 percent reinsurance credit risk charge affects the total RBC charge after the reinsurance credit risk is allocated to reserve risk and after covariance adjustments are applied across all risks. The table shows that across all companies, the total RBC charge would be 5 percent smaller if the reinsurance credit risk charge were eliminated (set equal to zero), and it would be increased 6 percent if the RBC charge were doubled (set equal to 20 percent). The changes to the reinsurance credit risk charge are more important to smaller companies than larger companies, decreasing total RBC by 21 percent if eliminated and increasing RBC by 25 percent if doubled. For some companies, where the reinsurance credit risk charge is relatively large in comparison with other capital charges, the effect is greater than the average.

²⁵ Provided by CAS RBC Working Parties from ongoing research work.

Table 2
Total RBC Charge after Covariance with Alternative Reinsurance Credit Risk Charges
(Total RBC in millions)

A	B	C	D	E	F
Asset Size Percentile	With Current Credit Risk Charge	With 0 Percent Credit Risk Charge	Percentage Chg	With 20 Percent Credit Risk Charge	Percentage Chg
0-20%	301	236	-21%	375	25%
20-40%	1,150	1,027	-11%	1,298	13%
40-60%	2,624	2,211	-16%	3,129	19%
60-80%	9,159	7,945	-13%	10,673	17%
80-100%	194,791	186,177	-4%	205,165	5%
Grand Total	208,024	201,372	-5%	224,662	6%
0%-80% Sub Total	13,233	11,418	-14%	15,474	17%

2,529 companies.

Table 3
Average Size Characteristics by Asset Size Band

Average Size (000s)					
A	B	C	D	E	F
Asset Size Percentile	RBC	Net WP	Dir WP	Adm asset	Surplus
0-20%	665	1,178	11,832	4,380	3,510
20-40%	2,277	4,613	31,338	15,567	11,719
40-60%	4,978	13,482	64,229	42,621	26,991
60-80%	17,217	53,205	156,484	142,940	77,274
80-100%	<u>379,709</u>	<u>739,825</u>	<u>639,748</u>	<u>2,487,288</u>	<u>1,210,791</u>
All	81,695	161,065	180,717	533,664	263,676

Reinsurance Usage and Probability of Impairment

The following analysis is based on the CAS RBC Research Working Parties, Report 4, *Review of Historical Insurance Company Impairments (1996 – 2010)*, Fall 2012 CAS E-Forum,²⁶ particularly from Section 2.5, Reinsurance Usage.

The study compared the observed impairment rates of companies based on the following risk characteristics: size, concentration by line, concentration by state, regional focus, and reinsurance usage.²⁷ The study covered 15 years (1996-2010) of impairments, a period over which the authors could match impaired companies to Annual Statement data that provided risk characteristics for impaired and non-impaired companies. Risk characteristics, e.g., size, were assessed on a group basis rather than an individual company basis. The observed number of impairments during that period was 416, which is 11 percent of the 3,684 legal entities considered, or 0.7 percent per year. The actual impairment rate might be higher, as the sources may not have identified all impaired companies, but that would not necessarily affect the findings of this study (page 10).

The Reinsurance Usage analysis showed the following:

1. Relative risk of company impairment increased as the group percentage of ceded premium²⁸ increased from 25 percent to 50 percent and thereafter (Table 7 page 10, reproduced at the end of this Appendix).
 - a. The 2,620 companies of total 3,269 in the data set had a ceded reinsurance percentage of 25 percent or less.
 - b. The 630 companies with group ceded reinsurance of 25 percent to 50 percent had twice the probability of impairment risk of companies with 0 percent to 25 percent group ceded reinsurance.

²⁶ Marchena, Eduardo, Allan Kaufman and Ji Yao, A Review of Historical Insurance Company Impairments, Report 4 of the CAS Risk Based Capital (RBC) Research Working Parties Issued by the RBC Dependencies and Calibration Working Party (DCWP), Casualty Actuarial Society E-Forum, Fall 2012-Volume 2, <http://www.casact.org/pubs/forum/12fforumpt2/RBC-DCWPRpt4.pdf>.

²⁷ In this report, the majority of impaired companies are those identified in A.M. Best's 1969-2010 P/C Impairment Review – Appendix B. Some additional companies not found in A.M. Best's report are included in the Report based on a review of National Conference of Insurance Guaranty Funds data and a list of inactive companies provided by the NAIC (footnote 1, page 1).

²⁸ Reinsurance usage is placed in four categories: 0-25 percent, 25-50 percent, 50-75 percent, and 75-100 percent, based on percentage ceded by group using the Underwriting and Investment Exhibit, Part 1B – Premiums Written, columns 1, 3 and 5. The all-lines written premiums for 15 years (1996-2010) are totaled by group. The ratio of a group's ceded written premium to its gross written premium is then calculated. This percentage specifies the ceded percentage category to which all companies in a group are assigned. This method excludes reinsurance with affiliates (page 10).

- c. The 338²⁹ companies with group ceded reinsurance of over 50 percent had nearly three times the probability of impairment risk of companies with 0 percent to 25 percent group ceded reinsurance.
2. The relationship between impairment rate and reinsurance usage varied by company size. Measuring size based on direct earned premium,³⁰ the following pattern was observed (Table 9, page 11, reproduced at the end of this Appendix):
- a. For companies in the smallest 20th percentile by group size, the relative impairment risk declined with increasing reinsurance usage; this was the opposite of the general pattern (table 9, page 10, reproduced at the end of this Appendix).
 - b. For companies in the mid-sized (20th percentile to 80th percentile by group size) and largest (80th percentile to 100th percentile) groups, the impairment risk increased with increasing utilization, consistent with the general pattern.
 - c. The upward pattern was stronger for the largest companies than it was for mid-sized companies.
3. Some important caveats to the study are:

Interaction of actual capital and impairment rate³¹

- a. Companies with the 0-25 percent ceded reinsurance had higher capital (measured as a ratio to RBC) than companies with ceded reinsurance 25 percent and over (Table 7, page 10).
- b. The smallest 20 percent of companies had higher capital (measured as ratio of capital to RBC over the 15-year experience period) than the larger companies (Table 4 page 7, not reproduced in this Appendix).

Credibility

- c. The number of companies in some data cells was relatively small, potentially affecting the statistical significance of some of the results (Tables 10 and 11, pages 12 and 13, reproduced at the end of this Appendix).

Interacting Factors

- d. There are a number of interacting factors, including: size, reinsurance usage, relative capital levels, and lines of business (discussed on page 6, illustrated in Table 5, page 8, not reproduced in this Appendix).
- e. The CAS working parties have a work stream using multivariate analysis techniques to further evaluate the phenomena, to address the question of credibility and interacting factors, which are described in points (c) and (d) above.

²⁹ Table 7 shows 229 companies with 50-75 percent ceded premium and 99 companies with 75-100 percent ceded premium. 338 is the total of 229 plus 99.

³⁰ 15-year average direct earned premium for the company (solo company) or group (if part of an NAIC group).

³¹ Higher levels of capital should have the effect of reducing impairment rates for smaller companies from what they would have been if capital levels for smaller companies were at the same level as for larger companies (page 11).

The key reinsurance usage tables from Report 4 are shown below (table numbers follow the numbering used in Report 4):

Report 4 - Section 2.5 - Table 7 - page 10

Written Premium - % Ceded to Gross Categories							
WP - % Ceded to Gross	Impaired Companies	Unimpaired Companies	Total	Median RBC Ratio³²	Mortality Rate³³	Relativity to Total	2010 Median RBC Ratio
0-25%	226	2,394	2,620	9.4	0.086	0.76	11.3
25-50%	105	525	630	7.7	0.167	<i>1.47</i>	8.0
50-75%	54	175	229	7.2	0.236	<i>2.07</i>	7.5
75-100%	<u>22</u>	<u>77</u>	<u>99</u>	<u>7.6</u>	<u>0.222</u>	<i>1.95</i>	<u>6.1</u>
Subtotal	407	3,171	3,578	8.9	0.114	1.00	10.4
No Data	<u>8</u>	<u>98</u>	<u>106</u>	<u>15.5</u>			<u>14.1</u>
Total	415	3,269	3,684	9.0	0.113		10.4

Relativity to Total – bold for below average; italic for above average

Report 4 - Section 2.5 - Table 8 – page 11

by Group Premium Percentile Group	Mortality Rates by Group Ceded Re % Category				
	75-100%	50-75%	25-50%	0-25%	Total
	0-20%	0.069	0.068	0.119	0.127
20-80%	0.283	0.350	0.189	0.155	0.187
80-100%	<u>0.333</u>	<u>0.149</u>	<u>0.151</u>	<u>0.048</u>	<u>0.067</u>
Total	0.226	0.237	0.167	0.085	0.113

Report 4 - Section 2.5 - Table 9 – page 11

by Group Premium Percentile Group	Mortality Rate Relativities by Group Ceded Re % Category				
	75-100%	50-75%	25-50%	0-25%	Total
0-20%	0.61	0.60	<i>1.05</i>	<i>1.12</i>	1.00
20-80%	<i>2.50</i>	<i>3.09</i>	<i>1.67</i>	<i>1.37</i>	<i>1.65</i>
80-100%	<u>2.94</u>	<u>1.32</u>	<u>1.33</u>	0.42	0.59
Total	1.99	2.09	1.47	0.75	1.00

Relativities – bold for below average; italic for above average

³² RBC Ratio is total adjusted capital divided by Authorized Control Level RBC, as defined in the Annual Statement (page 5, footnote 10).

³³ Mortality rate is the ratio of the number of impaired companies to the total number of companies by category (page 5).

Report 4 - Section 2.5 - Table 10 – page 12

by Group Premium Percentile Group	Number of Impairments by Group Ceded Re % Category				
	75-100%	50-75%	25-50%	0-25%	Total
0-20%	2	3	8	26	39
20-80%	13	41	59	116	229
80-100%	<u>6</u>	<u>10</u>	<u>37</u>	<u>77</u>	<u>130</u>
Total	21	54	104	219	398

by Group Premium Percentile Group	Total Companies by Group Ceded Re % Category				
	75-100%	50-75%	25-50%	0-25%	Total
0-20%	29	44	67	205	345
20-80%	46	117	312	748	1,223
80-100%	<u>18</u>	<u>67</u>	<u>245</u>	<u>1,616</u>	<u>1,946</u>
Total	93	228	624	2,569	3,514