



AMERICAN ACADEMY of ACTUARIES

To: Lou Felice, Chair, NAIC Risk-Based Capital Task Force

From: Academy Joint Risk Based Capital Task Force

Re: Comparison of the NAIC Life, P&C and Health RBC Formulas

As requested, the following is a current draft to update our comparison dated December 1, 1999 of the three NAIC RBC formulas (Life, P&C and Health). As this is still in draft format, there are missing pieces and there may be additional changes or edits.

The purpose of this comparison is to document where the formulas are substantially similar, where they differ, and the reasons for any differences that exist (as understood by one or more of the actuaries). The first comparison was provided to the NAIC in December of 1998. In several places we have noted work in progress on one or more of the formulas.

This report is structured into three sections as follows:

- I. **Overview** - outlining the three formulas, side-by-side
- II. **Summary of differences** - describing, in brief, the principal differences between the three formulas, and the reasons behind those differences (our understanding of the reasons). We have included, as requested, potential changes not yet adopted for the 2001 formulas. These changes are in italics for easier identification.
- III. **Detailed grids** - *(A new detailed grid for Asset Risks is under development but is not included in this draft)* delineating how each of the three formulas handle the various risk elements faced by Life, P&C or Health companies. Identified risks and risk factors which are not reflected in any of the three formulas have been noted in footnotes to the Insurance Risk, Credit Risk and Miscellaneous Risk grids in the December, 1999 Report and will not be included as they have not been changed. Please be aware that the list of risk factors in these grids is not exhaustive.

Any questions regarding the attached material should be directed to the Academy through Meredith Watts, Financial Reporting Policy Analyst at the Academy at (202) 785-7866.

Comparison of the NAIC Life, P&C and Health RBC Formulas

Summary of Differences

Invested Asset Risk

The risk factors for investment grade bonds are the same for the P&C and Health formulas. *The Life formula would reflect new pre-tax factors as well as after-tax factors which recognize the more immediate impact of the tax effect (based on DTA and DTL accounting) starting in 2001.* For other investments, there is one set of risk factors in the Life RBC formula, and a different set in the P&C and Health RBC formulas. The factors differ for the following reasons:

- . Different accounting bases (e.g. for bonds class 3-5, P&C and Health use market, Life uses amortized cost).
- . Different level of significance to the industry (e.g. mortgage investments are much more common for Life insurers than P&C insurers or Health entities, hence the risk factors are much more detailed for Life than P&C or Health. Also, property can be much more important for a Health entity than a Life or P&C insurer when that property is a hospital or other part of the health-care delivery system, hence the greater Health focus on property.).
- . Different risk assessment assumptions (e.g. the Life common stock risk factor of 30% *pre-tax* assumes a two year holding period and a 5% probability of ruin. The P&C and Health common stock factor of 15% assumes a one year holding period and a 1% expected policyholder deficit.)

The Life and P&C formulas have invested asset risk split into two covariance terms. For P&C the split is between fixed income risk and equity risk. This P&C split is based on an analysis of common stock versus bond risk correlation. For Life the split is between common stocks (all unaffiliated plus non-insurance affiliated common and preferred) and all other asset risk. The Health formula includes all invested asset risks in one covariance term. *The HRBC Working Group plans to review a proposal for a somewhat similar split for 2002.*

The Health formula contains asset risk charges for furniture and equipment, due to their importance in health care delivery (e.g. MRI machines, hospital beds). The other formulas instead rely exclusively on non-admitted asset rules for these items.

The Life RBC formula contains asset risk charges for derivatives and replications (synthetic assets). It also applies new rules to Modified Coinsurance and Funds Withheld Reinsurance so that the assuming carrier will apply RBC factors (C1cs, C1o and C3) to the assets related to the coinsurance/reinsurance.

Credit Risk

Comparison of the NAIC Life, P&C and Health RBC Formulas Summary of Differences

The three formulas treat credit risk very differently. The items that get risk charges differ, the sizes of the risk charges differ, their placement in the covariance formula differs, and the treatment of ceded amounts ("cedes") to affiliates differs.

The LRBC formula reflects only reinsurance credit risk and health provider capitation credit risk (starting in 1998), with no credit risk charge for other receivables. The reinsurance credit risk charge is 0.5% of ceded balances, based on the understanding that this risk is comparable to a class 1 or class 2 bond, with an offset for funds held. The resulting risk charge is included in C1o, typically the biggest item for life insurers. There is no charge for cedes to affiliates if the affiliate is 100% owned by the company in question. All other affiliate cessions are treated the same as cedes to unrelated entities. (The capitation credit risk charge is by itself in the Life covariance formula, and uses the same format and factors as the HRBC formula. See the Health discussion below for more details.)

The P&C formula applies a risk charge to most receivable items from the balance sheet that are not already reflected via non-admitted asset rules. The charge for ceded reinsurance is 10% of ceded balances, with the 10% based on judgement, and with no offset for funds held. The resulting reinsurance credit risk charge is split evenly between R3 and R4 (the latter is frequently the biggest covariance item for P&C insurers). There is no charge for cedes to any U.S. affiliates, regardless of ownership percentage or hierarchy, or certain pools. The risk charges for non-reinsurance related credit risk are generally smaller than the reinsurance credit risk charges, and are all in R3.

The HRBC formula generally follows the Life formula for reinsurance credit risk charges, the P&C formula for non-reinsurance credit risk charges, and adds an additional charge for credit risk arising from capitations¹. The capitation charge is a percentage of capitations paid to providers (roughly equal to two weeks of paid capitations²), or a larger percentage of capitations paid to intermediaries and other Health entities, reduced for any security pledged by the receiving entity. The total credit risk charge is by itself in the covariance formula. (The capitation risk charge was also introduced into the Life formula, starting in 1998).

Insurance Risk

Since the insurance products are different³ for Life, P&C and Health companies, the insurance risk formulas are different.

¹ Capitation payments to providers or intermediaries are effectively advance payments for service to insureds. The credit risk is that the provider or intermediary will not be able to provide the prepaid service, requiring the insurance company to pay again for providing the service to insureds.

² The implication here is that, on average, two weeks of capitation payments will be lost before realizing that the provider has stopped fulfilling its obligations and capitation payments are ceased.

³ The health insurance risks being the one exception.

Comparison of the NAIC Life, P&C and Health RBC Formulas Summary of Differences

The LRBC formula essentially has two different approaches to insurance risk, one for life products and one for health products. The life insurance risk charges are based on the net amount at risk. The health insurance risk charges are based on (Exhibit 9 claim⁴) reserves and premiums, and have been modified to bring them in line with the Health formula⁵. There is recognition of the insurer's size (measured by the amount of exposure), but not its experience. All the resulting risk charges are included in one covariance item. The Life formula does not include any factor for growth. There is no C-2 charge for annuities or surrender-value portion of life products, due to the understanding that statutory reserves for companies with these products already include an adequate measure of conservatism for the insurance risk.⁶ See below for details of the combined insurance/asset risk under Interest Rate Risk

The P&C RBC formula has an approach similar to that for Life RBC for health insurance, in that it has factors applied to (loss and loss expense) reserves and premiums. There is no recognition of the insurer's size, but there is recognition of its own experience. The resulting risk charges are split into two covariance terms, one for reserve risk and one for premium risk. There is also a growth charge, based on the group's (not just the company's) written premium growth for the last three years, which increases both the reserve and the premium risk charges for growth over 10%.

The HRBC formula has factors applied to premiums but not reserves (since the health products a Health entity generally writes are not believed to generate Exhibit 9-type reserves). There is recognition of the insurer's size but not its experience. Insurance risk is included in a single covariance item. A growth charge is included in the HRBC formula, but it is treated as a business risk, not an insurance risk since it relates to relative changes in RBC to changes in premium - suggesting a change in types of risks accepted.)

Changes in 2001 are proposed for the LRBC formula to expand the types of disability income insurance products and use factors based on updated data and a new model for evaluating the risk of ruin. The HRBC Working Group plans to review any changes implemented for the LRBC formula for inclusion in the 2002 HRBC formula.

⁴ Exhibit 9 claim reserves represent reserves for existing obligations, but for which the underlying service has not been provided or payment due. For example, for the 12/97 statement, the reserve for a medical claim that has yet to be presented but for which the treatment date was 11/97 would be included in Exhibit 11, while the disability income payments due in 1998 resulting from a covered 1997 disabling event would be included in Exhibit 9.

⁵ The LRBC formula retains a surcharge for certain Individual Medical premiums relative to the "standard" risk factor for Group premiums. The HRBC formula has never had a surcharge.

⁶ This reflects a major difference in reserving philosophy between life insurance and casualty insurance. Life insurance reserves are set so as to accommodate a normal range of variation in results. Property & casualty insurance reserves are set on a best estimate basis, such that half the time the ultimate payouts will be greater than the reserve, and half the time they will be less than the reserve. Therefore, statutory surplus for life companies is sometimes thought of as protecting against unusual (unfavorable) variation in results, with reported reserves (including additional actuarial reserves if considered necessary as part of the actuarial opinion) covering normal variation, while statutory surplus for p&c companies is thought of as protecting against all unfavorable variation in results. This major difference in reserving philosophies is beyond the scope of this summary / comparison.

Comparison of the NAIC Life, P&C and Health RBC Formulas

Summary of Differences

Interest Rate Risk

This risk is currently reflected only in the Life RBC formula. A more robust approach for the Life RBC formula was adopted in 2000 for some companies based on specific characteristics of their risks.

A proposal for reflecting P&C interest rate risk was turned down as too complicated, especially relative to its perceived significance to P&C solvency regulation. For Health entities, concerns for developing liquidity risk measures are being addressed by the Health Entities Working Group.

Business Risk

This risk is listed explicitly in the LRBC and HRBC formulas but not in the P&C formula.

The LRBC business risk charge was based primarily on litigation and guaranty fund risk, although a factor applied to separate account reserves was added in 1999. It now includes a charge related to Health Administrative Expenses, to bring it in line with the Health formula. The Health Administrative Expense charge is included under the radical in the covariance formula, as its own item. The other business risk amount is outside the radical.

The HRBC business risk calculation generally follows the Life formula approach mentioned above, except that the risk related to guaranty fund assessments is limited to premiums subject to assessment and all business risk is in a single covariance item, under the radical. In addition, HRBC business risk (found in H4) includes a growth charge based on the one year growth in a component of H2, where this growth is greater than the growth in the underlying revenue plus 10%.

The P&C RBC formula does not explicitly recognize business risk, except that the reserve and premium risk items reflect company loss experience, and the premium risk item incorporates the company's expense ratio.

Off Balance Sheet Risk

All the formulas follow essentially identical approaches for this item.

Comparison of the NAIC Life, P&C and Health RBC Formulas

Summary of Differences

Investments in Insurance Affiliates

All the formulas now follow an approach for common and preferred stock investments in insurance affiliates that potentially applies different risk factors to the book value of affiliates and the excess (based on market value). There are subtle but important differences.

The risk charge relating to the book value is included in the C0, R0 and H0 components. Only the P&C formula recognizes investments in affiliates' bonds as affiliate investments. None of the formulas provide special treatment to investments in affiliates that show up in the Other Invested Asset schedule (e.g. Texas Lloyds companies common in P&C insurance). Both the P&C and Health formulas cap the charge at the carrying value for the subsidiary, with no such cap in the Life formula.

Beginning in 2000, there is also a charge for insurance subsidiaries held at market value. The excess of carried market value over book value has a 22.5% charge applied, to be placed in the C1o, R2 and H1 components of the respective RBC formulas.

Covariance Adjustment

All the formulas contain a covariance adjustment. (This adjustment reflects the fact that the cumulative risk of several independent, i.e. uncorrelated, items is less than the sum of the individual risks⁷.) All the formulas keep insurance affiliate equity investment risk and off-balance sheet risk out of the covariance adjustment. The formulas vary, however, in which items within the covariance adjustment are assumed to be uncorrelated to each other.

The LRBC formula combines reinsurance credit risk, interest rate risk and most asset risks together as a single covariance item, i.e. it treats these risks as if they are perfectly correlated. The remaining piece of credit risk (health provider credit risk) and the non-affiliated common stock asset risk are treated as two additional separate covariance items. All insurance risk is combined into a single covariance item. Business risk is split into two covariance items, one piece (health administrative expense risk) inside the covariance formula, and the remainder outside the covariance formula.

⁷ The adjustment follows these steps:

- a. Add together items that are believed to be correlated, so that what is left is groups of risk items believed to be substantially uncorrelated to each other.
- b. Square these resulting groups.
- c. Add the resulting squares together.
- d. Take the square root of the result.

Comparison of the NAIC Life, P&C and Health RBC Formulas Summary of Differences

The P&C RBC formula separates asset risks into two separate covariance components, fixed income asset risk and equity asset risk. Credit risk is also usually split⁸, with half of reinsurance credit risk included with other credit risk in a single covariance item, and the other half of reinsurance credit risk added to reserve risk⁹. Insurance risk is split into two covariance items (reserve risk and premium risk). Business risk is only reflected to the extent it is associated with premium or reserve adequacy, hence it is combined with the premium and reserve risk items. Interest rate risk is not reflected.

The HRBC formula includes all of asset risk in one covariance item, all insurance risk in another covariance item, all credit risk in a third covariance item, and all business risk in a fourth covariance item.

The covariance adjustment drastically reduces the importance of the smaller items, and increases the dominance of the biggest items affected by the adjustment¹⁰. The dominating items vary for Life, P&C and MCO companies. Life insurers tend to have asset risks (other assets in C1o) dominate their covariance adjustment. Health entities tend to have underwriting risk (C2) dominate. P&C insurers tend to have insurance risk dominate, with reserve risk (R4) dominating for commercial lines companies, a mix of premium (R5) and reserve risk for personal lines companies, and premium risk dominating for start-ups.

Taxes

The LRBC formula has proposed changes to adjust all risk values to after-tax values and to allow the full amount of DTAs and DTLs in the Total Adjusted Capital. The P&C RBC and HRBC formulas have determined not to change any risk factors for taxes for 2001, and both Working Groups have proposed to remove the values of DTAs and DTLs in TAC.

⁸ The word "usually" refers to the fact that credit risk treatment under the P&C formula can vary, depending on the relationship of reserve risk to reinsurance credit risk. Under the formula, most companies will see the covariance treatment described above, but shell companies or companies that cede substantially all their business will see all credit risk included as a single covariance item.

⁹ The split of reinsurance credit risk in the P&C formula was a compromise between the desire for the charge to remain significant after covariance (accomplished by adding the charge to frequently the largest item in the P&C covariance calculation - reserve risk), and the acknowledgement that many reinsurer insolvencies are caused by things other than reserve risk.

¹⁰ This can be seen from the following simplified example, where only two items are contained in the covariance adjustment.

<u>A</u>	<u>B</u>	<u>A+B</u>		<u>$(A^2+B^2)^{0.5}$</u>	<u>% reduction in B's influence</u>
10	1	11	vs	10.05	95%
10	5	15	vs.	11.18	76%
10	9	19	vs.	13.45	62%

Comparison of the NAIC Life, P&C and Health RBC Formulas Summary of Differences

The LRBC formula also proposes including an expanded "sensitivity test" to allow analysis of pre-tax RBC values and TAC without DTAs and DTLs.

Comparison of the NAIC Life, P&C and MCO RBC Formulas Summary of Differences

<u>Risk category</u>	<u>Where found in the NAIC RBC formula (in whole or in part)</u>		
	<u>Life</u>	<u>P&C</u>	<u>Health</u>
(Invested) Asset			
Fixed Income	C1o	R1	H1
Equity	C1cs ¹ , C1o	R2	H1
Derivatives/replications	C1	-	-
Credit (non-invested assets)			
Reinsurance ²	C1	R3, R4	H3
Health Provider	C3b	-	H3
Other (misc. rcvbles)	-	R3	H3
Insurance			
Amount at risk	C2 (Life)	-	-
Premium	C2 (A&H)	R5	H2
Reserve	C2 (A&H)	R4	-
Interest rate risk	C3a	-	-
Business risk ³			
Expenses	C4b	R5	H4
Separate Accounts	C4a	-	-
Guaranty fund	C4a	-	H4
Growth	-	R4, R5	H4
Other	C4a	R4, R5	-
Off balance sheet risk	C0	R0	H0
Investments in Insurance affiliates ⁴	C0,C1o	R0,R2	H0,H1

¹ Non-affiliated common stock plus common and preferred stock of non-insurance affiliates are in C1cs. Other types of equity (or non-fixed income) assets are in C1o.

² This chart lists the predominant location of reinsurance risk in the P&C RBC formula. Under certain conditions (e.g. that found in a company that cedes 100% of its business), all the reinsurance credit risk would be in R3.

³ Depending how one defines business risk, the use of company experience adjustments (R4, R5) and the company expense ratio (R5) in the P&C RBC calculation may be considered a reflection of business risk.

⁴ When the asset is held at market value and the market value exceeds the statutory book value, RBC on the allowed excess is included in C1o, R2 and H1.

Comparison of the NAIC Life, P&C and MCO RBC Formulas

Summary of Differences

Description of RBC components

Life RBC

- C0 Insurance affiliate investment and (non-derivative) off-balance sheet risk
- C1cs Invested common stock asset risk
- C1o Invested asset risk, plus reinsurance credit risk except for assets in C1cs
- C2 Insurance risk
- C3a Interest rate risk
- C3b Health provider credit risk
- C4a Business risk - guaranty fund assessment and separate account risks
- C4b Business risk - health administrative expense risk

Company action level RBC = $C0 + [(C1o + C3a)^2 + (C1cs)^2 + (C2)^2 + (C3b)^2 + (C4b)^2]^{1/2} + C4a$
--

P&C RBC

- R0 Insurance affiliate investment and (non-derivative) off-balance sheet risk
- R1 Invested asset risk - fixed income investments
- R2 Invested asset risk - equity investments
- R3 Credit risk (non-reinsurance plus one half reinsurance credit risk)
- R4 Loss reserve risk, one half reinsurance credit risk, growth risk
- R5 Premium risk, growth risk

Company action level RBC = $R0 + [(R1)^2 + (R2)^2 + (R3)^2 + (R4)^2 + (R5)^2]^{1/2}$

Health RBC

- H0 Insurance affiliate investment and (non-derivative) off-balance sheet risk
- H1 Invested asset risk
- H2 Insurance risk
- H3 Credit risk (health provider, reinsurance, misc. receivables)
- H4 Business risk (health administrative expense risk, guaranty fund assessment risk, excessive growth)

Comparison of the NAIC Life, P&C and MCO RBC Formulas Summary of Differences

Company action level RBC =

$$H_0 + [(H_1)^2 + (H_2)^2 + (H_3)^2 + (H_4)^2]^{1/2}$$