

C1 Bond Factor Development

Presentation to NAIC's C1 Factor Review Subgroup

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Discussion Outline

- Background: RBC Principles, the C1 Component & Treatment of Risks
- The Calculation Engine: Definition of Projected Loss & Protection Level
- Calculating Base C1 Factors
- Key Modeling Assumptions
- Portfolio Construction
- Treatment of AVR
- Outstanding Issues
- Next Steps



Background on RBC

- Purpose of RBC is to identify weakly capitalized companies
- RBC calculation is based on statutory accounting principles
- RBC establishes a minimum level of capital
 - Protects statutory surplus from fluctuations
 - C1 charges protect statutory surplus from losses in statutory asset value due to bond defaults, common stock depreciation, and other changes that flow through statutory surplus.
- RBC framework is based on separate distributions for material risk components (i.e., C0–C4 RBC components) that are aggregated to determine total capital requirements
- Required capital calculation assumes a going concern
- Required capital is an add-on to policy reserves under the assumption that policy reserves are adequate



Background on the C1 Component

- C1 capital protects against future *excess* asset losses
 - Policy reserves make provision for expected asset losses
 - C1 capital makes provision for asset losses in excess of expected
 - Current RBC does not provide for extreme or catastrophic levels of loss
- C1 capital covers the risks of default loss, deferral, subordination & credit leverage, and event risk
- C3 capital covers the risks of call/early redemption/prepayment, extension, disintermediation, reinvestment
- Life RBC does not cover the risks of fair value depreciation, currency fluctuation, and liquidity



Bond Calculation Engine

- One calculation engine is being built for bonds
- Other calculation engines could also be built for different asset classes (e.g., municipals, structures, RMBS/CMBS, etc.) – TBD
- Initially, each rating category will be analyzed separately (i.e., AAA, AA, A, etc.). Subsequent analysis will likely show that rating categories can be combined in determining C1 factors.



Bond Calculation Engine: Definition of Projected Loss

- Engine will project Losses Given Default (LGD) based on historical experience
- Losses will be projected over a specified projection period (e.g., ten years)
- Projection of losses will be based on the assumed economic conditions at the start of the projection period (e.g., expansion or recovery)
- Economic scenarios will be simulated over the modeling period using a U.S. expansion and contraction transition matrix



Bond Calculation Engine: Definition of Protection Level

- C1 factors cover loss, where loss is defined as the net principal and accrued interest loss given default, in excess of the expected loss assumed in statutory policy reserves
- Current C1 capital requirement for all assets generally provides for losses approximately the 95th percentile (*note: the level of protection, including the risk metric, for C1 RBC is a regulator choice*)
- Current C1 factors establish aggregate protection for a bond portfolio at approximately the 96th percentile
 - The C1 bond factors are specified by NAIC designations 1-5 at the 92nd percentile
 - NAIC designation 6 bonds are carried at market value; the C1 bond factor for NAIC 6 bonds was set equal to the factor for common stocks



Calculating Base C1 Factors

- The C1 capital charges are derived from a simulation model where the cash flows for a representative bond portfolio are projected assuming different economic scenarios
- The required capital for a given economic scenario equals the amount of initial funds needed such that the accumulation of this initial amount and subsequent cash flows will not become negative at any point throughout the modeling period
- Additions and subtractions from this fund are projected over the modeling period:
 - Additions include interest, tax recoveries of default loss, and an annual “risk premium” to fund future losses (i.e., the annual AVR contributions)
 - Subtractions include net default losses and taxes on earned interest

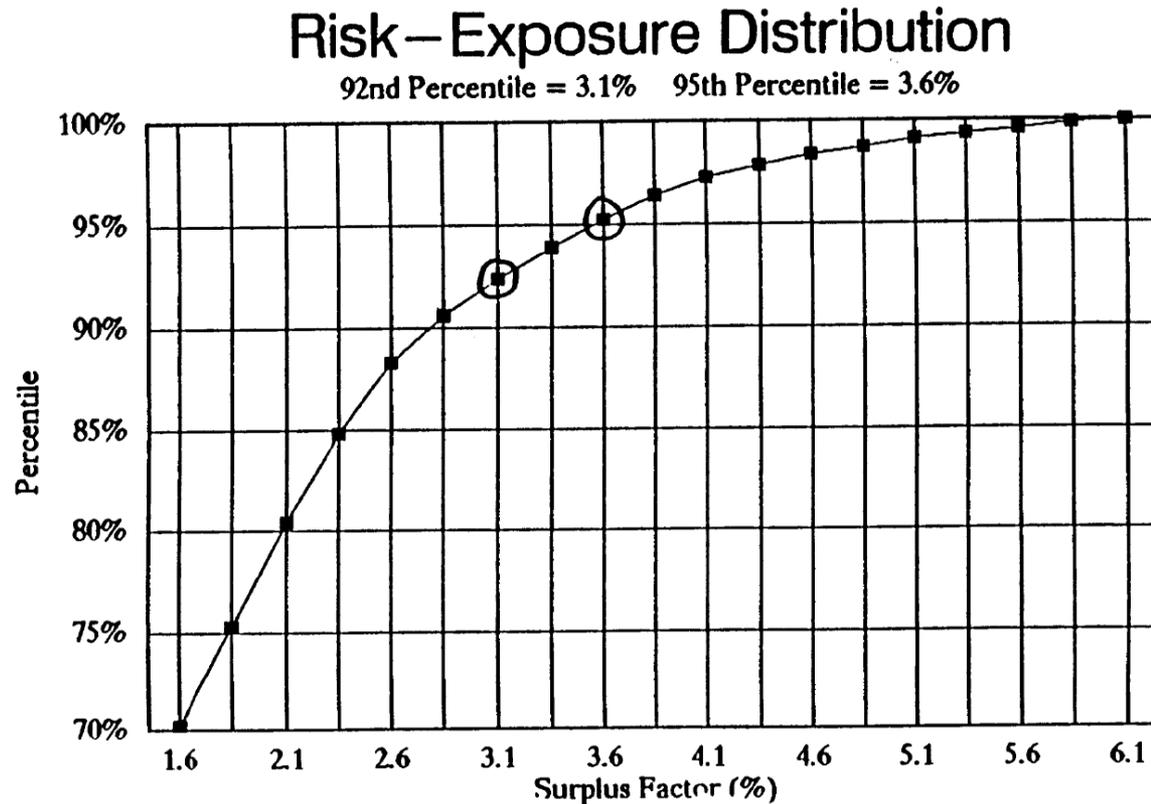


Calculating Base Capital Factors (cont.)

- The required capital for a given economic scenario equals PV of the net cash flows discounted at a specified interest rate. Current DR = 6%.
- Simulations project varying economic conditions
 - Default rates and recoveries vary from a baseline assumption dependent on the economic condition
 - Simulations with 2000 trials of 400 securities in each rating category are performed
- Required capital amount for each simulation is divided by beginning assets to get a required capital factor
 - The required capital factors for each economic scenario are rank-ordered, thereby producing a distribution of required capital factors
 - Current C1 charge for each NAIC rating designation 1-5 is set at the 92nd percentile



Illustration of Distribution of C1 Factors*



The amount of surplus required for defaults over and above the 1.0% annual contributions to a "default reserve"; shown at the upper-tail of the risk-exposure distribution.

*Source: 1991 Report of the Industry Advisory Committee to the Life Risk Based Capital Working Group Exhibit 1.4



Key Modeling Assumptions

- 10 Year modeling period
- Expected default rates from Moody's Default Studies, based on the rating at time of default
- Volatility of default assumption will be reflected using Monte Carlo techniques where each bond is tested for default each year where the probability of default varies with that year's economic conditions
- Principal recovery equals a varying percentage of the principal, where the percentage varies by the NAIC category (current approach; more discussion needed)
- Salvage value reinvested in a like quality asset with maturity equal to the remaining time in the projection
- Credit for tax offset TBD. Current C1 factors are based on 50% offset.



Portfolio Construction

- Bond portfolio will consist of bonds issued of varying ratings, par amount, and maturities (i.e., an inforce portfolio)
- Representative securities rather than real securities or cusips will be modeled (TBD: how to generate the representative securities? Number of bonds in the modeled portfolio, characteristics, etc.)
- Base C1 factors assume all bonds are held at par value (TBD: how to determine or apply C1 factors for bonds not carried at par?)



Treatment of AVR

- AVR was established to smooth out the impact of losses on surplus. AVR represents a provision for expected loss.
- The *AVR balance* has no bearing on the determination of required capital levels. AVR is a source of funds for required capital, but the AVR balance is not directly related to required capital.
- In the current C1 factor development, future contributions to the AVR are explicit assumptions in the bond model and modeled as contributions to the required capital fund. C1 factors are lower due to the annual AVR contributions.
- The treatment of AVR requires further discussion



Outstanding Issues

- Adjustments to base C1 factors
 - Concentration
 - Sector
 - Portfolio size/diversification
 - Other?
- C1 for other asset classes
- Correlation between asset classes
- Correlation with other RBC components
- Tax Adjusting C1 factors
- Changes to C3 factors?
- Differences between Life, Health, and P&C RBC



Next Steps

- Define the characteristics of the representative portfolios
- Generate the representative portfolios for corporate bonds
- Complete the bond calculation engine and sub-models
 - Finalize treatment of AVR and taxes
 - Finalize assumptions (e.g., source of default data, recovery, economic model, interest)
- Scope out plan for determination of C1 factors for structured securities
- Compare required capital for investment risks in different regimes, such as Solvency II
- Evaluate different types of credit models – structural, closed form, etc.
- Generate preliminary C1 base bond factors for each rating (e.g., AAA, AA, etc.) for different time frames and confidence levels; identify & illustrate the major assumptions



Next Steps (cont.)

- Obtain C1 Factor Review Feedback
- Rerun base bond factors based on feedback
- Determine adjustments to be made to base bond factors
- Develop preliminary C1 bond factors with adjustments
- Estimate impact of preliminary C1 bond factors on industry required capital
- Adjust preliminary C1 bond factors based on feedback, analysis
- Present preliminary results to CADTF/VOSTF ?

