VOSTF Training—Structured Securities Modeling & Implications for Risk-Based Capital

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Presentation to NAIC's Valuation of Securities Task Force

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Discussion Topics

I. Life Risk Based Capital Overview

A. Provision for Credit and Other Investment Risks
B. Interaction with Statutory Policy Reserves

II. Calculation of Structured Securities RBC Requirements

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Life RBC Overview

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Risk-Based Capital

- The original purpose of the RBC framework was to identify potentially weakly capitalized companies.
- The RBC ratio (an insurer's capital/risk-based capital requirements) provides regulators with concrete intervention points.
- RBC is not designed to be a measure of capital strength or to rank the capital strength of insurers.
- Since being implemented in 1994, RBC has been used for additional purposes, not always in line with the design of RBC.
- RBC is not a sufficient basis for managing individual company risks, such as credit risk. RBC is a blunt instrument, designed and calibrated with a specific regulatory purpose.
- RBC is a constraint on insurers' decisions (e.g., asset allocation, security selection, risk appetite), but should not be the sole risk measure for investment decisions. Most insurers maintain capital far in excess of regulatory minimums to achieve their desired financial strength rating and have available capital for adverse events and growth initiatives.

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Historical Development of RBC

- Existing solvency framework was developed in the late 1980s with the intention of developing more "risk-focused" tools.
- Six NAIC designations were implemented.
  - Replaced the Investment/Non-investment grade scheme to facilitate RBC calculation.
  - Mandatory Securities Valuation Reserve (MSVR) was replaced with RBC and Asset Adequacy requirements.
- The capital requirements for bonds were updated in 2021 utilizing an expanded twenty NAIC designations.

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The Continuum of Loss Provision in Statutory Annual Statements (assumed approximations)

- Policy Reserves: 0-85th
- Company Action Level Capital: 85-95th
- Free Surplus: 96th and beyond

The use of the 85th percentile is consistent with life statutory policy reserves covering losses up to approximately the first standard deviation.

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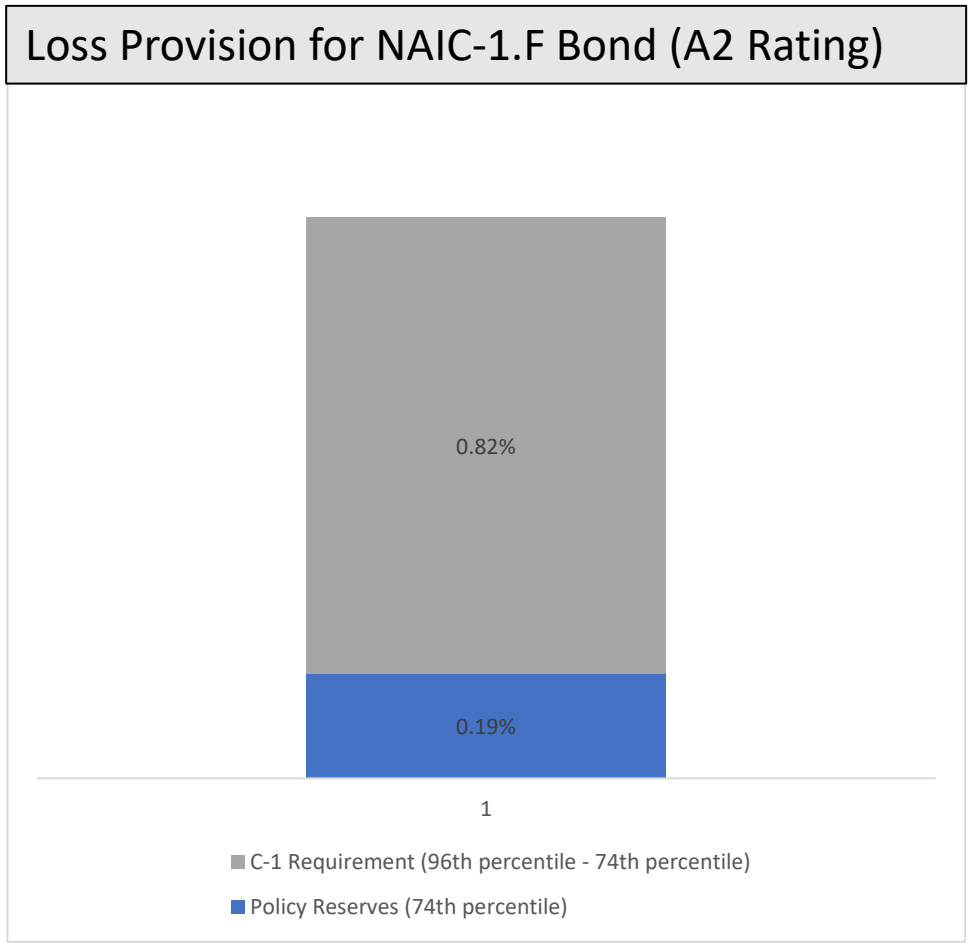
Solvency Balance Sheet (simplified example, assuming portfolio of A2 bonds)



- Policy reserves are assumed to cover anticipated bond losses up to the expected loss plus half a standard deviation. For A2 rated bonds, this is the 74th percentile, but the percentile varies by rating
- LRBC is assumed to cover anticipated bond losses after recovery up to the 96th percentile.
- The pre-funding of anticipated future losses is quantified in the C1 calculation as a percentage of statutory carrying value (for life insurers, statutory carrying value = amortized cost for NAIC designations 1-5).
- For NAIC 1.F bonds (i.e., A2 rated bonds), the C1 factor is equal to 0.82% carrying value (before tax).
- The total expected loss of 1.00% is prefunded by a combination of reserves (0.19%) and capital (0.82%).

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Provision for Credit Losses in Statutory Requirements: Policy Reserves and LRBC

- Statutory policy reserves make provision for expected losses in the future.
- Required capital (C1) makes provision for adverse losses in excess of expected. C1 bond provision covers losses assumed to fall at the 96th percentile over a 10-year time horizon (at portfolio level).

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Background on the C1 Component

- C1 capital protects against future *excess* asset losses.
  - Policy reserves make provision for 85th percentile asset losses.
  - C1 capital makes provision for asset losses beyond 85th percentile.
  - Current RBC does not provide for extreme or catastrophic levels of loss above the 96th percentile.
- 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.

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C1 Bond Factor Calculation Assumptions

- The most material assumptions for the C1 bond factors are the probability and severity of loss, as C1 pre-funds the Loss Given Default (LGD).
- C1 bond factors are developed from a model that projects future LGD for each class of bonds, where a class is equivalent to a rating class.
- Default and recovery assumptions are based on the loss experience reported by Moody's and S&P.
- The calculation of the C1 requirement flows directly from the reported values and designations in the statutory Annual Statement.
- The C1 requirements for several asset classes use the basic bond factors. This usage is based on relative risk assessment and the materiality or the asset class. This usage is considered sufficient, but not based on first principle modeling of the specific asset class.
- More information on the derivation of the C1 bond factors can be found here: Academy C1WG Documentation Corp Bond Factors Aug 3 2015 Final.pdf (actuary.org).

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Feedback Loop

- Rating → loss distribution → NAIC designation → C1 factor, etc.
- If we don't know the loss distribution associated with an NAIC designation, it becomes more difficult to assign a C1 factor.
- We recognize certain inconsistencies between NRSRO (Nationally Recognized Statistical Rating Organization) rating methodologies and in the application of C1 factors to the reported values. These inconsistencies are not considered to materially affect the predictive nature of RBC in identifying weakly capitalized insurers.

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LGD Distribution

- The model used to develop C1 RBC factors for corporate bonds produces future LGD distributions.
- LGD distributions inform the type of risk metric most appropriate for measuring the risk.
- Sufficiently large corporate bond portfolios demonstrate an approximately normally distributed loss pattern, where very large losses become exceedingly rare. In particular, because recoveries are typical in the event of a default, large bond portfolios do not exhibit excessive tail risk.
- The loss distribution for corporate bonds suggests that a percentile metric will sufficiently capture the losses.
- Some asset classes do not exhibit a similar pattern of losses. For example, Collateralized Loan Obligations (CLOs) exhibit a pattern of losses with potentially higher LGD and therefore more tail risk. A different risk metric is appropriate for these assets. As recommended by the C1SC in December, 2022, we believe the C1 requirement for CLOs should be based on a CTE metric (Conditional Tail Expectation).
- Note that the capital requirements for other risks (e.g., the C-3 market risk) are based on a CTE metric.

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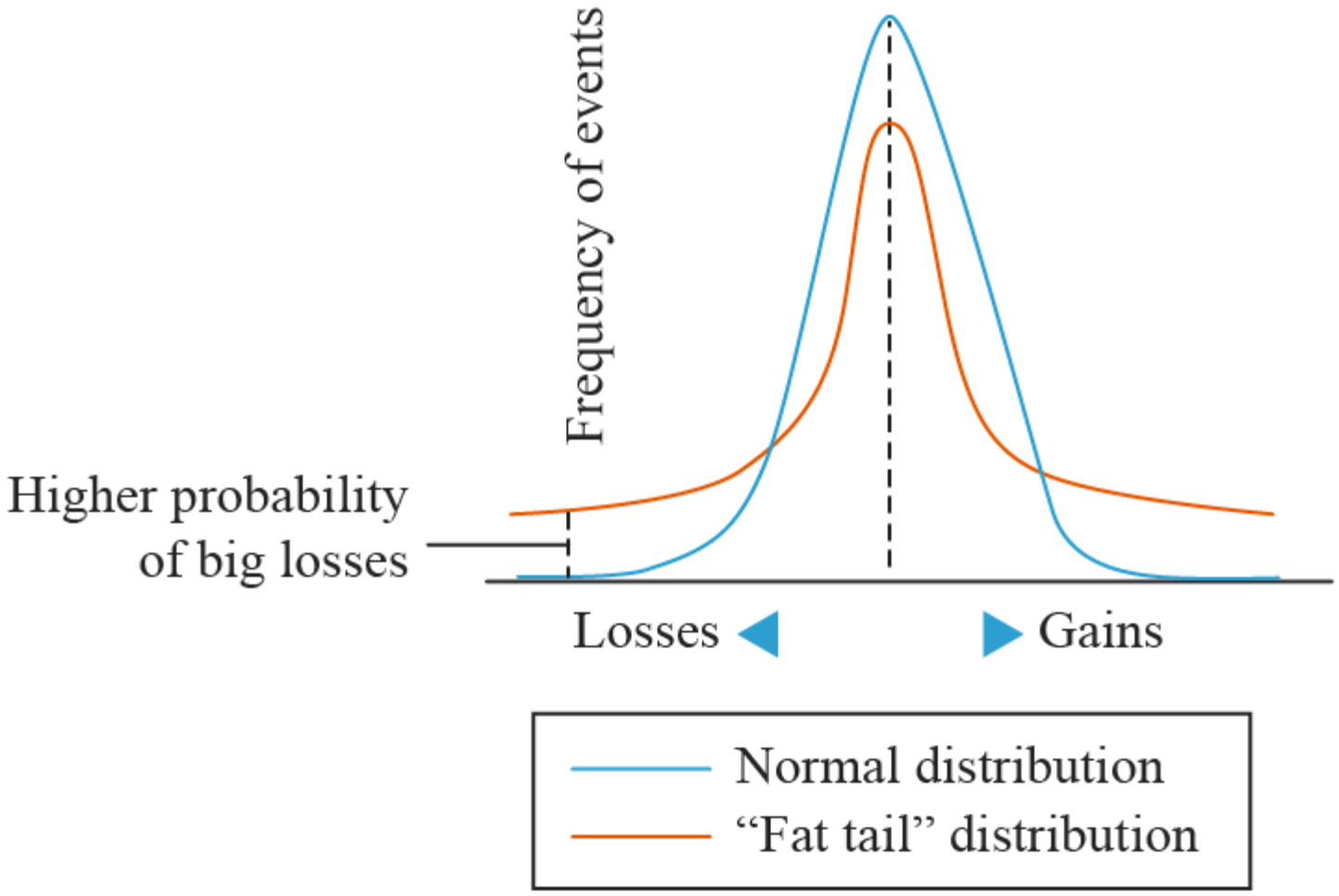
Fat Tails



Source: bookmap.com/blog/what-are-fat-tails-in-trading/

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Asset Capital Requirements for Life Insurers: Practical Issues

- RBC is mostly calculated from published, statutory values; capital requirements are not updated quickly. Regulators have expressed the desire to have one measure that allows for auditability and some comparability across insurers.
- RBC is directly affected, intentionally or unintentionally, by changes in statutory reporting and valuation.
- The U.S. solvency regime differs from other jurisdictions, largely a reflection of differences in asset carrying values and valuation standards.

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Risk-Based Capital for Structured Securities

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RBC for Structured Securities and the Applicability of Designations

- In the Great Financial Crisis of 2007-2008, the calculation of capital requirements for structured securities (i.e., residential and commercial mortgage-backed securities, or RMBS and CMBS) were modified from using the bond factors to an approach utilizing a modeling of each specific security (i.e., the so-called "BlackRock methodology").
- The ratings methodologies of the major NRSROs were inconsistent with RBC principles and the designations could not be used as a basis for the RBC calculation.
- With the rise of structured securities, and CLOs in particular, questions have been raised on the use of designations and/or modeling in determining capital requirements.

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Executive Summary: C-1 Asset Modeling

- The American Academy of Actuaries proposes a flowchart to determine whether (a) an asset class needs to be modeled and (b) whether securities within an asset class need to be modeled individually to determine C-1 factors.

- Preference is given toward simpler solutions—if an existing factor can be used, it should be used. Individual security modeling for C-1 determination is a last resort.

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Threshold Questions

- For an asset class to be considered using this flowchart, it should first be verified as having all of the following attributes:
    1. Materiality or likely materiality in the future across the industry. Allocations from a small handful of companies would not justify changes to the RBC formula.
    2. The risk that would be modeled needs to be incorporated in C-1. For example, illiquidity alone would not be a sufficient justification because C-1 does not measure illiquidity risk.
    3. The expected benefits of a more precise calculation should outweigh the expected costs of building and using a new model. Costs include both time and energy spent to build the model as well as the negative effect of added complexity within the RBC formula.
- The burden to justify the consideration of a more precise calculation falls on the party asking for a more exact determination of RBC; such justification will provide the catalyst for further consideration of the impact across the entire industry among regulators and interested parties.

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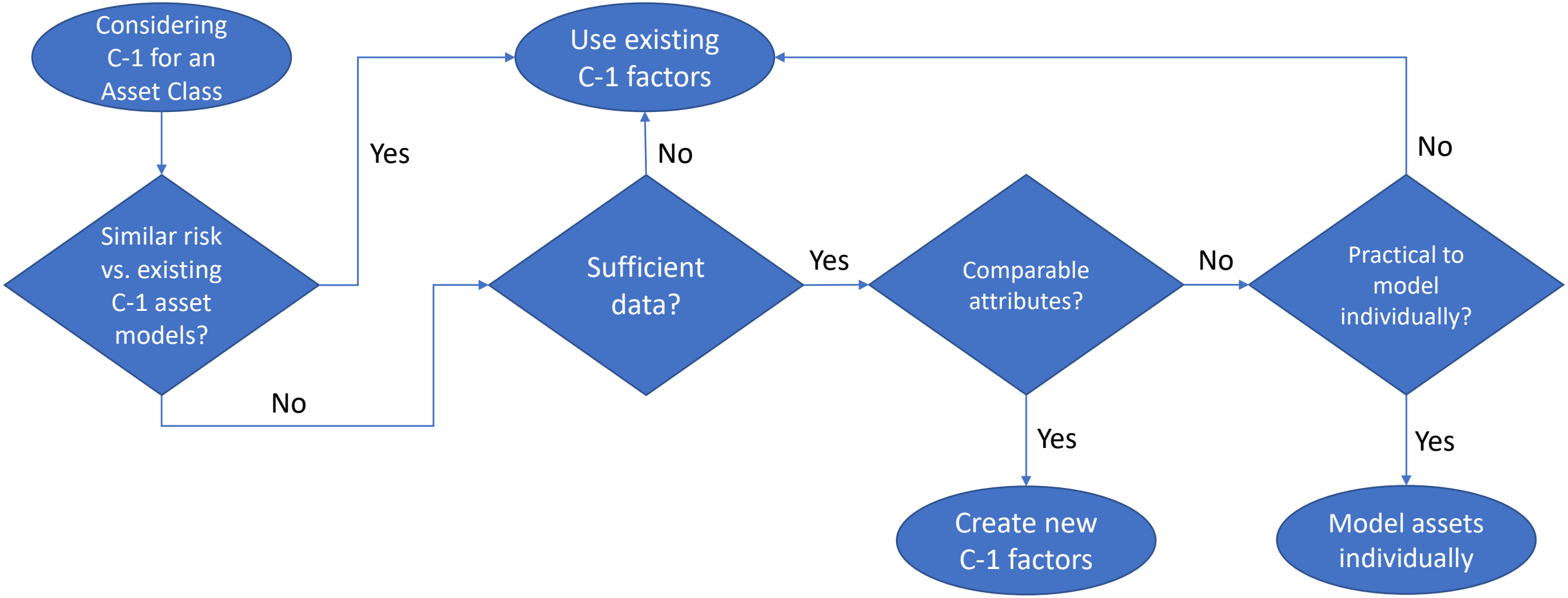
C-1 Modeling Flowchart



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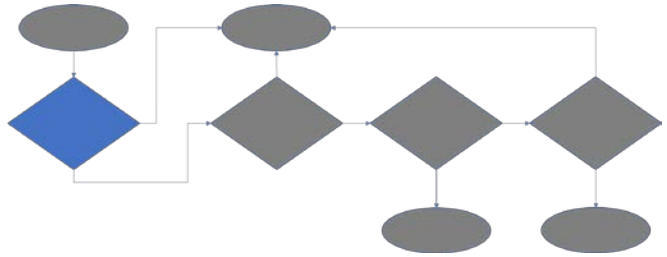
Decision: similar risk vs. existing C-1 asset models



- Answer “yes” if the relative risk differences between risk categories (usually ratings or designations for fixed income) is similar to that of an existing set of C-1 factors.
- For example, municipal bonds and bank loans would each likely have an answer of “yes,” because relative increase in risk as ratings decrease is similar to that of corporate bonds.
- CLOs and some other structured securities would likely have an answer of “no,” because tail risk increases more quickly as the rating decreases compared to corporate bonds.

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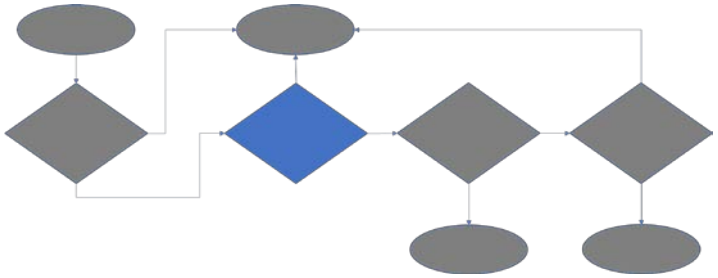
Decision: sufficient data



- Answer “yes” if data exist to enable risk modeling, and in particular tail risk modeling.
- For example, CLOs would likely have an answer of “yes,” because their bank loan collateral has ample historical loss data and the waterfall structure is well documented.
- Some esoteric ABS, especially residual tranches, may have an answer of “no” if insufficient data are available.

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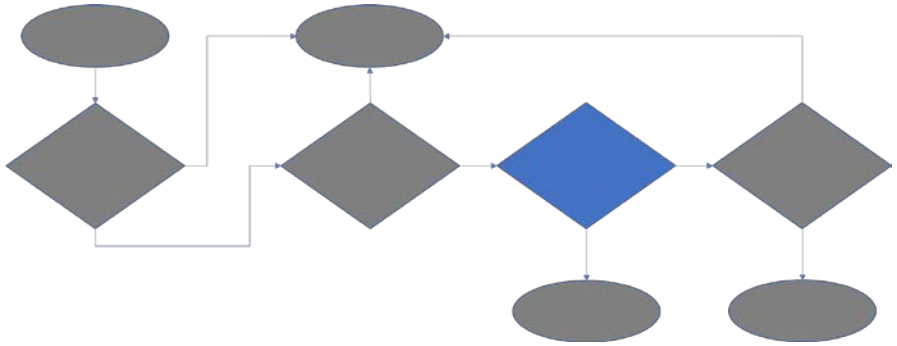
Decision: comparable attributes



- Answer “yes” if most individual assets within this asset class have an easily identifiable attribute that can be used to sort the assets into risk buckets.
- For example, CLOs would likely have an answer of “yes,” because most CLOs are rated by CRPs and those ratings can reasonably sort each individual CLO security into a risk bucket.
- Asset classes that are typically not rated by CRPs may have an answer of “no” here, but don’t automatically. For example, commercial mortgage loans are also a likely “yes” because DSCR and LTV substitute for CRP ratings as comparable attributes.

Initialism guide: CLO = collateralized loan obligation. CRP = credit rating provider. DSCR = debt service coverage ratio. LTV = loan-to-value

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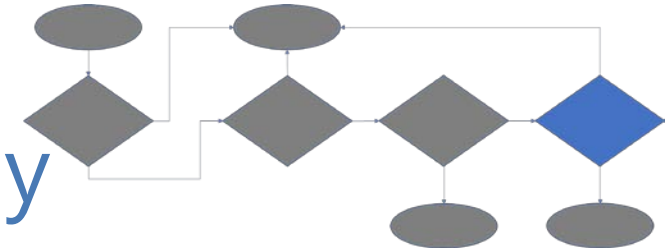
Decision: practical to model individually



- Answer “yes” if individual assets within the asset class have several attributes that differentiate individual assets and can be used for risk modeling or if existing modeling software can be used.
- For example, CLOs would likely have an answer of “yes.” because off-the-shelf software exists that can model individual CLOs (however, CLOs may never have arrived at this decision point if they were deemed to have comparable attributes).
- If modeling cannot reasonably be done in a timely and cost-effective manner for RBC filing, then the answer here must be “no.”
- Some esoteric asset-backed securities (ABS) may have an answer of “no” if the relevant risk is so specific to each deal that a common modeling framework does not apply across a reasonably large share of securities.

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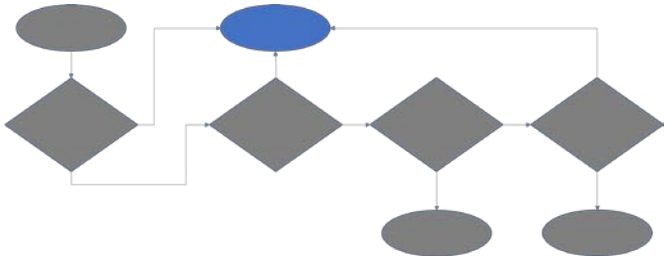
Outcome: use existing C-1 factors



- This outcome can either mean to use existing C-1 factors directly, without adjustment, or it can mean to make slight adjustments to existing C-1 factors.
- For example, municipal bonds and bank loans currently use corporate bond C-1 factors without adjustment.
- Schedule BA real estate currently uses Schedule A real estate C-1 factors but with an upward adjustment resulting in a proportionately higher C-1 factor for BA real estate.

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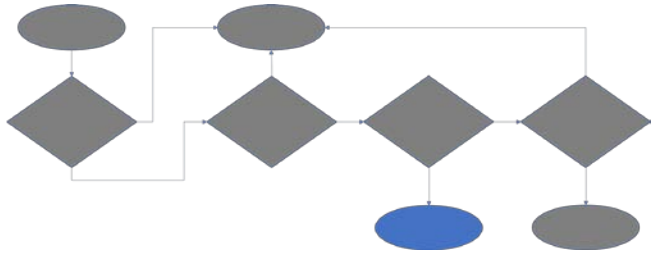
Outcome: create new C-1 factors



- This outcome means that a new set of C-1 factors should be developed for this asset class.
- For example, CLOs may retain the 20 possible designations that they are currently mapped into. But instead of those 20 designations corresponding to the 20 corporate bond C-1 factors, CLOs may instead have their own set of 20 C-1 factors.
- Instead of just a slight adjustment to existing C-1 factors, this outcome requires fundamental modeling work to derive new factors.

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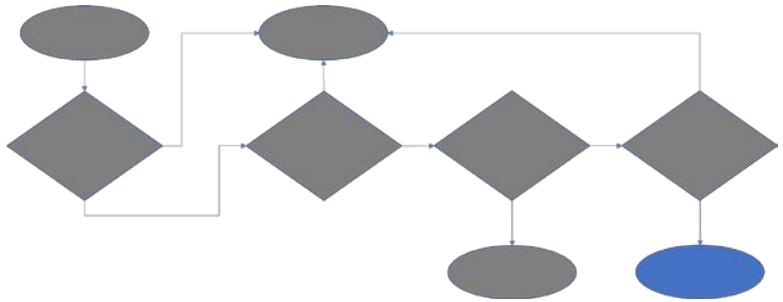
Outcome: model asset individually



- This outcome means that each asset within this asset class needs to be modeled individually in order to generate a C-1 factor.
- In practice, this is currently how non-agency RMBS and CMBS are treated. The modeling work is done by the Structured Securities Group to determine the NAIC designation, after which point corporate bond factors are used. This is functionally similar to modeling each RMBS and CMBS security individually to determine its C-1 factor.
- Because of the significant operational complexity involved, this outcome is a last resort.

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Major Takeaways

- NAIC Designations are directly used in calculating RBC for bonds and structured securities. The one-to-one mapping between NRSRO ratings and NAIC designations flows directly into the RBC calculation.
- Changes to the process for assigning designations could affect RBC.
- The credit loss experience assumed in developing RBC factors is based on LGD experience for the NRSRO ratings (i.e., Moody's and S&P). C1 requirements pre-fund credit losses only. Other investment risks are pre-funded in other parts of LRBC, or not covered in the NAIC regulatory framework.
- There are known differences between rating methodologies and the C1 models (along with other discrepancies), but ratings need not be designed for RBC in order to be useful for RBC.
- While RBC is intended to be a blunt instrument, certain risks are unique to an insurer and can't be sufficiently captured by a set of universal factors applied to every company. Consequently, certain RBC requirements are calculated from a model of an insurer’s unique portfolio of assets or liabilities.
- The increasing allocation of assets to structured securities, coupled with their increased complexity, has led to questions among regulators regarding the sufficiency of existing provisions for loss—AG 53 addresses this for reserves, and several recent proposals across VOSTF, SAPWG, and RBCIRE seek to address this for capital

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QUESTIONS

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