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# Use of Models for the Supervision of Regulatory Capital

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# Presenter

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# Agenda

- Overview
- What is a “Model”?
- Uses of Models
  - Non-Life Risks
  - Life Risks
- Achieving Consistency
- Limitations



# Overview

- Models are crucial to understanding the business and risks of an insurer and, therefore, are a critical component of regulatory capital supervision
- We appreciate the thoughtful consideration given to the use of models in the recent ICS consultation



# Overview

- As capital standards are refined, it will be important to discuss the appropriate use of models in order to:
  - Ensure appropriate capital is held to support complicated risks
  - Recognize the differences between risks for life and non-life insurers
  - Recognize the differences in risk profiles among insurers
  - Ensure regulator understanding of models that are used for the supervision of regulatory capital



# Overview

- The Insurance Core Principles (ICP) contain important guidance on the use of models for both managing risks and for setting solvency standards
- We believe ICP 16, *Enterprise Risk Management for Solvency Purposes*, and ICP 17, *Capital Adequacy*, are most applicable to this discussion



# Overview

- The following ICP 17 subsections are of particular relevance with respect to setting capital standards:
  - 17.1 *Capital Adequacy in the Context of a Total Balance Sheet Approach*
  - 17.2, *Establishing Regulatory Capital Requirements*
  - 17.6.7 *Structure of Regulatory Capital Requirements - Approaches to Determining Regulatory Capital Requirements*
  - 17.7.5 and 17.7.6 *Treatment of Risks Which Are Difficult to Quantify*



# What is a “Model”?

- Models are simplified representations of reality<sup>1</sup>
- Due to the uncertain nature of insurance cash flows, models are essential to properly manage insurance risk

<sup>1</sup>J.M. Pemberton (1999). The Methodology of Actuarial Science. British Actuarial Journal, 5, pp 115-195.





# What is a “Model”?

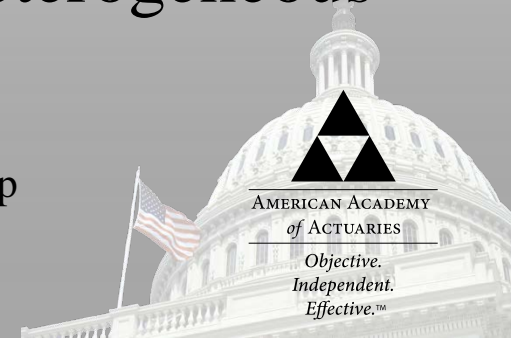
- Regardless of the type of model, the user will need to become knowledgeable with the model in order to understand it, trust the results, and utilize the results effectively
- For purposes of this presentation, I will focus on models used to measure risk for capital management and enterprise risk management (ERM) purposes
  - ICPs 16 and 17, discussed earlier, provide additional guidance



# Models in the Supervision of Capital

- Factor-based approaches may be adequate to quantify capital requirements for certain types of risks
- However, factor-based approaches may not capture all key risks
  - Models provide regulators and insurers with additional tools to measure an insurer's exposure to complex risks or where the risks are heterogeneous<sup>2</sup>

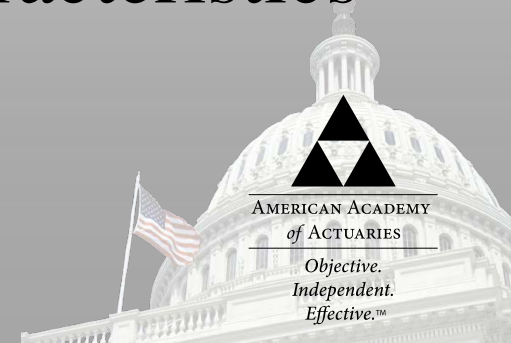
<sup>2</sup> In actuarial terms, the risks for individual members of a heterogeneous group can vary significantly from the group average.



# Models in the Supervision of Capital

- Hybrid approaches<sup>3</sup> using factor-based methods for some risks and models for others may be an appropriate solution for the determination of regulatory capital
- Due to the differences between life and non-life risks, it is necessary to tailor models and approaches to their specific risk characteristics

<sup>3</sup> Such as the one shown in Table 4 of Section 9 of the recent ICS Consultation Document



# Uses of Models: Non-Life Risks

- The major risks for non-life insurers that may require modeling arise from insurance contract liabilities:
  - Reserve estimation risk, particularly for heterogeneous categories
  - Pricing/underwriting/event risk
  - Catastrophe risk, which is often modeled using third-party models
  - Reinsurance credit risk, which exist in some cases



# Uses of Models: Non-Life Risks

- Certain health insurance products must recognize the risk of adverse medical trends as well as unfavorable regulatory changes
- Differences in risks among insurers (even when products appear similar) require different parameterizations, if not different models



# Uses of Models: Non-Life Risks

- The following are examples of differences that affect the level of risk accepted by the insurer:
  - Underwriting
  - Claims handling
  - Markets
  - Reinsurance programs
  - Policy limits and/or contract language
  - Geography



# Uses of Models: Life Risks

- Life risks often arise from the interaction of product features and the assets backing those products
  - Models are often used to capture the interaction of asset and liability cash flows over longer time horizons and under different economic environments
  - Investment risks often more important for longer-duration liabilities



# Uses of Models: Life Risks

- Models are often necessary to measure investment risks, particularly over a long-term horizon
  - Asset-liability management (ALM) risk is best understood, managed, and measured through a dynamic cash flow testing model
  - Certain risks can only be measured in a timely manner with an appropriate model
    - e.g., interest rate risks and equity market risks
  - Risk management strategies, including partial or full hedges and diversification need to be included in the model in order to reflect their impact appropriately





# Achieving Consistency: Non-Life Risks

- Determining the consistency and comparability among insurers is challenging due to variations in underwriting, products, claim handling, markets, geographic concentration, business mixes, etc.
- Approaches to address these issues include:
  - Back-test model output against actual losses from a past event (where possible)
  - Create standards for data input quality
  - Require a model validation process
    - Regulators may need to hire third parties or provide a centralized facility in order to review models



# Achieving Consistency: Non-Life Risks

- Prescribed assumptions should be jurisdictionally-specific, and regulators should be wary of the heterogeneity problem



# Achieving Consistency: Life Risks

- Prescribed assumptions:
  - Assumptions that do not vary by company, such as standardized macroeconomic assumptions
    - Calibrated to an appropriate level for a given jurisdiction
  - Any model assumption where there is no credible experience, such as upper age mortality
    - e.g., over age 100



# Achieving Consistency: Life Risks

- Prescription of assumptions can give a false sense of increasing consistency unless they are tailored in a way that appropriately reflects differences in insurers' risk profiles



# Achieving Consistency: Life Risks

- Variations should be allowed based on credible company experience, product design, degree of duration matching, hedge effectiveness, distribution, etc., with appropriate justification of experience and documentation from the insurer



# Limitations

- Certain risks that are currently difficult to model accurately
  - e.g., policyholder behavior, exercise of options, etc.
- Certain behaviors that are difficult, if not impossible, to model with credibility
  - e.g., active investment portfolio management, strategic business decisions, etc.



# Conclusion

- Despite their limitations, models help insurers and regulators understand:
  - How different behaviors and elections can affect the solvency of a company
    - Which is difficult to accomplish with a pure factor-based approach
  - The overall business and risks of an insurer
- Combining modeling with other appropriate, factor-based, metrics can mitigate some of these concerns.
- Models remain a critical component of capital supervision



# Contact the Academy

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