

# A Deterministic Scenario Approach to Risk Management

Thomas Hull<sup>1</sup>

Presented at  
2010 Enterprise Risk Management Symposium  
Society of Actuaries  
April 12-15, 2010

Copyright 2010 by the Society of Actuaries.

All rights reserved by the Society of Actuaries. Permission is granted to make brief excerpts for a published review. Permission is also granted to make limited numbers of copies of items in this monograph for personal, internal, classroom or other instructional use, on condition that the foregoing copyright notice is used so as to give reasonable notice of the Society's copyright. This consent for free limited copying without prior consent of the Society does not extend to making copies for general distribution, for advertising or promotional purposes, for inclusion in new collective works or for resale.

---

<sup>1</sup> Thomas Hull, FSA, is also a member of the Swiss Association of Actuaries with over 20 years of experience in the insurance industry. Prior to joining Deloitte in Switzerland, he worked for large U.S. and international financial services organizations in several roles, including ALM, product development and marketing. As a consultant, he has advised clients in solvency and risk management, stochastic valuation models and market-consistent embedded value calculation.

## **Abstract**

Techniques used in risk management have grown in mathematical and technical sophistication over recent years, leading to a quality of analysis on known and calibrated risks.

The current credit crisis has shown, however, that overreliance on historical data and analytical models may not provide sufficient data to analyze very high-impact events and might actually lead to overconfidence. In addition, the process of building models has a tendency to focus developers on preconceived risk constellations and the impact of specific events, whether singularly or in combinations determined through correlation matrices.

Scenario analysis and stress tests based on consideration of shock events and their possible repercussions can provide useful information to management and regulators on a company's resiliency through a chain of events, as well as support the consideration of a firm's operations as an integral part of a wider financial system. By careful selection, construction and analysis of scenarios unfolding over a period of time, a more holistic picture of the firm's risk position can be created. Additionally, because such scenarios have at their heart a story-line, the communication process with key stakeholders is less abstract than discussions focused on distributions, tails and other mathematical constructs.

Finally, we also discuss how scenario analysis and stress testing can be used to define a company's risk appetite, which is at the core of a well-embedded ERM framework. The theoretical approach discussed will be supported through the presentation of the construction and analysis of an event-chain scenario deriving from recent global financial developments.

There is no shortage of literature on the (in)ability of human beings to assess risk properly. Collectively we have short-term memories along with a disinclination to forego short-term gains when we perceive risks to be distant or unlikely. The literature of how people view risk depending on context, group size and numerous other factors is extensive. Quantitative models have proven to be extremely useful in helping us quantify risks, understand observed phenomena, explore the sources and impacts of financial risk, and develop tools and methods for managing risks. At their best, models remove a great deal of bias and subjectivity from risk analysis as well as give us a measurement tool.