

Don't Chance It: Getting More Out of Risk Modeling

Risk analysis and modeling can be an important tool to support deeper, more insightful management discussions about a wide range of strategic, operational, financial, and hazard risks. But it is often used improperly and poorly understood by senior managers. Promoting and embedding risk analysis into core management processes, however, can help resolve issues earlier (when they are usually cheaper to fix), enable better development of contingency plans that permit a rapid response to crises, and potentially identify opportunities to turn negative risks into avenues for future growth. Risk modeling and analysis should be an integral part of strategic and operational decision making, not a specialized expertise outside the mainstream of management processes.

Room for Improvement

Risk modeling and analysis have become very sophisticated, thanks in part to continuing increases in computing power. Emphasis in modeling has shifted away from “deterministic,” single-answer models to “probabilistic” models such as Monte Carlo simulations, which enable a user to fully understand a range of outcomes and the probability of certain outcomes

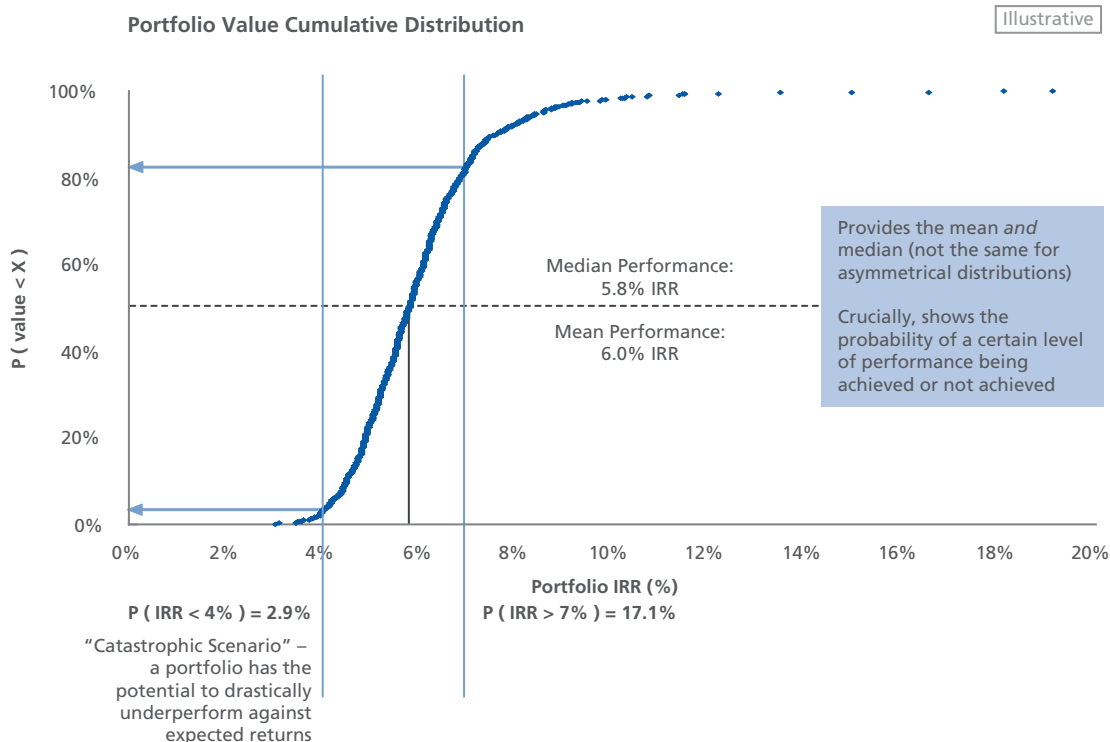
occurring. As Exhibit 1 shows, a Monte Carlo model not only provides an estimate of the most likely outcome, but can provide answers that scenario-based analysis using a deterministic model cannot. What is the probability of an unacceptable outcome occurring (in the example below, a rate of return less than four percent)? What is the probability of a rate of return greater than seven percent? A deterministic model may tell you what combination of factors may lead to such a result, but not the *probability* of that combination of factors occurring. Unless management asks these types of questions of their risk analysts, however, the power of modern risk analysis will not be tapped.

Despite improvements in modern risk analysis, there is plenty of evidence that companies are still failing to fundamentally progress in terms of how they manage risk:

- Investors in collateralized debt obligations (CDOs), for example, failed to understand the cascading of risk that would occur in the event of a downturn in the housing market and increased defaults by high-risk homebuyers.¹

1. See for example, “Behind AIG’s Fall, Risk Models Failed to Pass Real World Tests,” *Wall Street Journal*, October 31, 2008.

Exhibit 1 Example Probabilistic Model: Monte Carlo Simulation



Source: Oliver Wyman analysis.

- The delays in development and production of the Airbus A380 and Boeing 787 are both examples of risk management failures. For the A380, Airbus failed to identify and manage the key risk of designing the wiring using different CAD systems in different plants. For the 787, Boeing failed to identify and manage the risk of creating its first lean and globally distributed supply chain system, and then the risk of accepting incomplete deliveries at its plant in Seattle.
- Structured finance products, such as aircraft securitizations, have fallen far short of their expected revenues despite analysis of the risk of these notes by ratings firms such as S&P and Moody's, indicating incomplete or deterministic risk modeling.

A key problem is that any model, no matter how sophisticated, requires a great many assumptions

as part of its construction, e.g., about statistical data, about future changes in systems, about what is/will be important to model, analyze, and track. The output from a risk model thus can never be considered fully accurate and "finished"—rather risk modeling generates an estimate of the probabilities of different outcomes based on the assumptions made in the modeling process. As such, it functions best as an ongoing input into robust discussions between the various parts of an organization. Those discussions should include regularly revisiting assumptions to check that they are still valid.

Good Risk Modeling: Lessons Learned

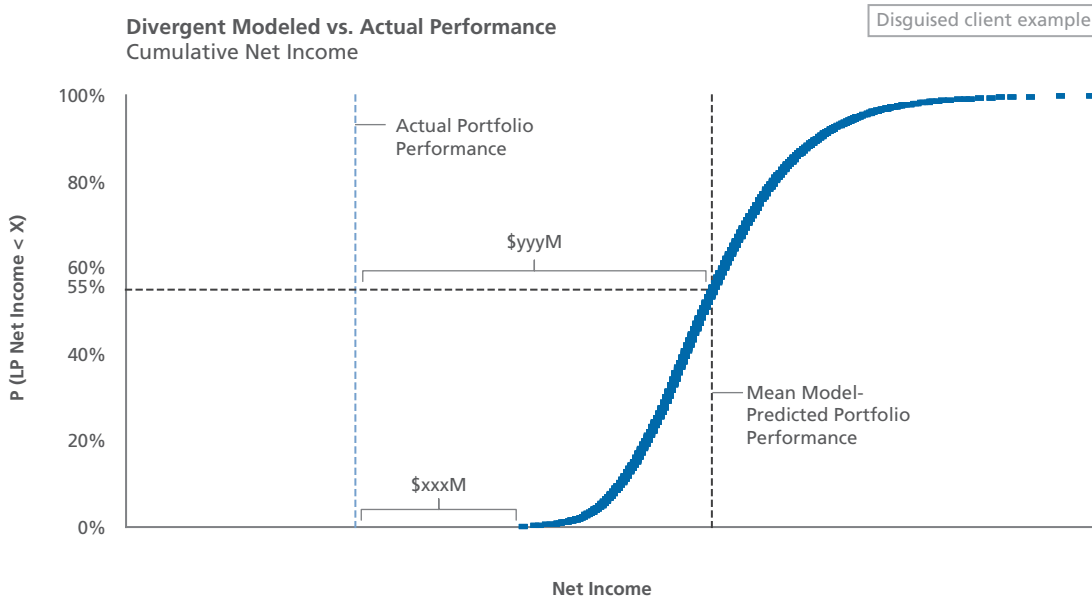
Even simple readouts from the results of a risk modeling tool such as a Monte Carlo simulation can yield great insights into a portfolio's potential performance and risk profile. If the model is well constructed, actual performance should never be outside the range of modeled results. In the

example shown in Exhibit 2, actual performance of an asset-backed financial instrument was outside the range of all outcomes generated by the Monte Carlo model of the instrument. An appropriately constructed Monte Carlo model should, if run a sufficient number of iterations, generate results that cover the full range of potential real-life outcomes. In the case shown, the result was significantly outside the range indicated by 5,000 iterations of the model in question, strongly indicating serious flaws in the modeling process.

Key “lessons learned” for constructing a good model include:

- Clearly lay out model assumptions, discuss which ones are key, and regularly return to them. Part of the challenge, given the number of assumptions made at different levels in constructing a model, is to review assumptions in a meaningful and insightful way.
- Model both quantitative and semi-quantitative data/inputs. Even if there is not rich data about a particular effect, it can still be modeled—capturing the insights of industry experts is part of the art of risk modeling.
- Employees in the operational parts of the business must have input into risk models and must sanity-check their outputs—risk analysis is too important to be left to just “risk experts,” who often do not have the front-line experience to understand the fundamental dynamics and underlying risks of the business being modeled.
- Be aware of the purpose of the model—as with any model, the end user must be able to understand how it works and the results it generates. It should not be a “black box,” operated by experts, with no insight into the assumptions and logical workings of the model.

Exhibit 2 Example of Flawed Modeling



Source: Oliver Wyman example.

- Don't incorrectly focus on the mean case, best case, or a few specific scenarios; discussion should focus on the range of possible outcomes and the probability of specific outcomes. Understand the trade-offs between risk and performance.
- Understand *all* of the risks—including contractual risks. There are risks both inside and outside the business, and contractual structures can both add significant risks for investors as well as mitigate them.

Oliver Wyman's Approach to Risk Analysis and Management

By paying attention to the fundamentals of good risk modeling, risk analysis can be instrumental in informing and supporting the management of a business or a transaction. But it is equally important to understand that it is just one part of a well-formed risk management process. Oliver Wyman has helped numerous companies better manage their risks through an enterprise-wide approach to risk management that includes:

- Strategic, comprehensive risk detection, including scenario planning, based on an in-depth understanding of the market sector in question as well as the financial structure of a business or financial instrument
- Risk modeling/analysis and total risk profile development, including concentrations and correlations between risks
- Risk financing integration (e.g., integrated financing of hazard and financial risks)
- Incorporation of risks into strategic planning, performance measurement, and pricing decisions

For more information on Oliver Wyman's perspectives on risk modeling, please contact your Oliver Wyman account partner or one of the following partners:

Pablo Wangermann

+1-214-721-1510

pablo.wangermann@oliverwyman.com

Jim Bohlman

+1-214-758-1885

jim.bohlman@oliverwyman.com

Oliver Wyman

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Oliver Wyman's Corporate Finance Practice

Oliver Wyman's Corporate Finance Practice provides a range of services to support investors and debt providers in transactions related to the automotive, manufacturing, transportation, and energy sectors. Our capabilities include support for M&A, structured finance, project finance, restructuring/workouts, and post-transaction integration.

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