"Effective Resilience" and Interdisciplinary Approaches to Risk

by Rick Gorvett

Enterprise risk management (ERM) is at a critical point in its evolution as a process.

After more than a decade of development, there seems to be little doubt about the appropriateness of a holistic, ERM-type perspective for identifying, quantifying and managing risks. Much of ERM's evolution thus far has involved the marketing of its framework and potential, and while there continue to be a few holdouts against this approach to risk management, most people and organizations do recognize the inherent logic and sensibility of an ERM process (while sometimes disagreeing about the specifics of its implementation). Overall, certain guiding principles of ERM generally seem clear—for example (among many):

- Risks should be viewed within the context and framework of the entire firm—including its operations, market strategy, human resources, etc.

- ERM is "everyone's business"—all members of an organization should be familiar with, invested in, and have a role in the process.

- Successful implementation of ERM requires a high-level advocate in the organization.

These, and many other, guiding principles are clearly important and foundational. However, now that the basic ERM idea has been successfully marketed, practitioners and researchers in ERM need to build upon these core concepts. With the ever-expanding interest in such things as stress-testing and economic capital, and the potential introduction of mandated evaluations such as the National Association of Insurance Commissioners' (NAIC's) Own Risk and Solvency Assessment (ORSA), additional meat and muscle need to be added to our emerging skeletal risk management structure.

There are still many advances to be made in both the conceptual and technical underpinnings of ERM. Only with the creation and development of those enhancements—many of them of a quantitative nature—will ERM ultimately live up to its full potential.

An Interdisciplinary Perspective

One suggested enhancement to risk management and ERM is to broaden our framework and reference base—i.e., to recognize the potential of advances in other fields and disciplines to enlighten our understanding and analyses of risks. For example, areas such as behavioral economics and complex systems, while sometimes unfairly considered to be "flavor-of-the-month" pop fields of study, actually have developed important techniques and insights, which may have direct relevance for risk management. Certainly, a better understanding of human cognitive tendencies and methods of decision making, and then incorporating those dynamics into the risk management analytical framework, is a worthwhile and important endeavor, and can help us to better appreciate the nuances of people's perception of, and reaction to, risks.

An "Effective Resilience" Factor

Another suggestion is to enhance our toolkit for quantifying risks by, as much as possible, considering risk in a multidisciplinary context. As a particular example, a risk metric, *effective resilience*, is suggested.

"Resilience" is a widely used and applied word, both in everyday language and in various fields of study. The term has been used to represent a technical measure in fields such as ecology, systems engineering, psychology, economics and

"Effective Resilience" ... *by Rick Gorvett*

materials science. Although the details and specific applications differ, the term has a common core meaning across these different areas: resilience represents the ability of a system (or an organization, or an individual person) to recover or "bounce back" from an adverse situation or event. Resilience is both an intensity- and time-dependent function of a system: initially, the level of adversity suffered by the system depends on the intensity (or magnitude) of the event; generally, the level of recovery of the system increases over time (i.e., the adverse position of the system is gradually diminished due to recovery/risk management efforts). Put another way, the ability to respond to, and recover from, an adverse event and its negative impact—across both intensity and time dimensions—directly affects the organization's operating level.
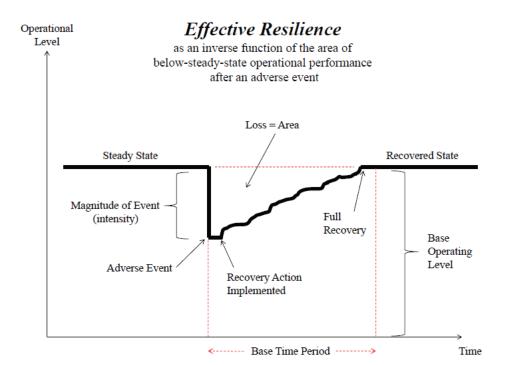
An *effective resilience factor*, then, is a risk metric that reflects an organization's exposure and response to an adverse event, and measures the ability of the organization to

mitigate the reduction in its operating level. A generalized example is found in the accompanying exhibit.

For a given *Base Time Period* and *Base Operating Level* (the product of which is the **Base Area**, which reflects normal or steady state operations in the absence of an adverse event), a smaller *Loss Area* (the area of reduced operating level, below the steady-state level and above the organization's recovery path) in the exhibit would represent greater organizational resilience. Thus, for a given adverse event and a given risk management recovery action, the *Effective Resilience Factor* (ERF) of a firm can be determined as

$$ERF = \frac{Base\ Area - Loss\ Area}{Base\ Area} = 1 - \left(\frac{Loss\ Area}{Base\ Area}\right)$$

Defined in this way, the *ERF* takes on a value between 0 and 1, with a value closer to 1 indicating greater organizational resilience (based on the assumed risk management/disaster recovery strategy).

Effective Resilience
as an inverse function of the area of below-steady-state operational performance after an adverse event

"Effective Resilience" ... *by Rick Gorvett*

The modeling of the recovery path (the gradual increase in operational level from its lowest point at or immediately after the time of the adverse event, to full recovery) would be inherently multi-disciplinary. The path would necessarily be a function of broader economic, financial and labor market factors, and (for evaluating an insurance company) insurance market conditions in light of the adverse event (which may or may not be systemic). Such modeling would require assumptions regarding, for example, consumer behavior, supply-demand shifts and interactions, and the nature and extent of interrelationships within this very complex system. A risk management strategy effectiveness metric like *ERF*, which makes explicit and transparent assumptions about these parameters and interactions, and accounts for macroeconomic and other effects consistent and concurrent with an adverse event, would be very attractive.

The exhibit shows a simple cross-section of one adverse event. To reflect a portfolio of risks to which the organization is exposed, a three-dimensional surface chart could be produced. The horizontal *x* and *y* axes would be the different intensities of adverse events, and the times to recovery, respectively. The vertical z axis would reflect the loss level associated with a given event intensity at a given time after the event (during the recovery process). The effective resilience metric could then be calculated as the double-integral, or the area under the surface. For a given list of adverse events and intensities, a firm could test and compare different risk management strategies, by observing the resulting effects on the resilience factor of changing strategies.

In summary, some of the attractive characteristics of an *effective resilience* measure are that it:

- Summarizes in one number, with a value between 0 (low resilience) and 1 (high resilience), the effectiveness of a risk management plan.

- Reflects the adequacy and effectiveness of disaster planning and recovery strategies, rather than just quantifying adverse scenarios. It thus is consistent with the ORSA desire to promote and encourage good risk management, looked at from a broad and holistic perspective.

- Can be used to compare the relative resilience of different organizations to a common hypothetical adverse scenario.

- Can be used to compare, for an individual organization, the relative effectiveness of different operational and recovery strategies in response to a hypothetical adverse scenario.

By informing our risk management evaluations and decisions with interdisciplinary concepts and techniques, and recognizing the potential impact of risks on all scales—company, market and economy—of the operating environment, we will create a more effective and robust ERM process.

Rick Gorvett, ASA, ARM, CERA, FCAS, FRM, MAAA, Ph.D., is director of the actuarial science program, and State Farm Companies Foundation Scholar in Actuarial Science, at the University of Illinois at Urbana–Champaign. He can be contacted at *gorvett@illinois.edu*.