

Insights

Assessing the Value and Challenge of ERM Implementation

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Introduction

A “risk portfolio” represents the aggregation of risks, where risk is measured as variance in outcomes. A “risk source” is a condition yielding random outcomes that can be represented by a probability distribution. Understanding the portfolio effect of managing an organization’s all-encompassing sources of risk in aggregate has potential consequences for the risk management strategy of any corporation and is perhaps most obviously observed within the insurance industry.

The total risk of a risk portfolio depends on the interdependencies among individual risks, just as the total risk of any given financial portfolio depends on the interdependency of investment outcomes held in the portfolio. The portfolio effect of risk aggregation is one of the key pillars of enterprise risk management (ERM). ERM incorporates risk aggregation to optimize an organization’s overall risk management process, which implies that management needs to understand both the individual risk sources as well as the interdependencies across these risk sources.

Optimizing the portfolio effect of organization-wide risk aggregation therefore could result in a variety of benefits, including:

- Lower risk management costs, including lower premiums, resulting in lower cost of capital-generating value creation

- More effective capital allocation
- Better-informed strategic decisions (when considering the acquisition of a new business, for example, assessing its risk from a portfolio perspective rather than a stand-alone perspective may provide a more accurate acquisition value)

The objectives of this paper are to illustrate the benefits of managing risk in aggregate, to understand some of the causes for delay in implementation of an enterprise-level approach to risk management and to offer advice on possible methods to overcome these issues.

Value Creation

Within the realm of risk management, it is commonly known that the aggregation of uncorrelated risks results in a reduction of variance. That is, the aggregated variance is less than the sum of the individual variances. How much less depends on correlations across the individual risk sources. Estimating the total risk through rigorous aggregation is a mathematical improvement upon a simple sum in which the collection of risks would be considered only on an individual basis. The improved estimation and the resulting improved management decisions that risk aggregation can bring to a firm requires estimation of the interdependencies, or correlations, across the firm’s risk sources. This concept naturally extends to many other statistical measurements in portfolio management, such as Value-at-Risk (VaR), and is commonly referred to as the “portfolio effect.”

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The exact effect of aggregation on a risk portfolio is not obvious, as the relationships among risks move through various degrees of correlation. We anticipate, however, the best effects of aggregation when risk sources are perfectly negatively correlated and worsening effects as correlations move toward perfectly positive correlation. Few conditions, however, are likely to be negatively correlated, and therefore we tend to seek uncorrelated situations or only slightly positively correlated conditions for the benefits of aggregation.

Furthermore, accurate measurement of correlations across risk sources may well be out of the reach of many managers. Through interviews with industry professionals, we have found that few individuals possess an intuition for correlation factors, and even fewer have found mechanisms for collection of needed data. Yet these values pervade the essence of ERM. What's more, correlations appear to be significant. For example, a brief review of the correlations between categories of risks defined in Solvency II reveals standards generally between 0.25 and 0.5; so they are closer to zero than to one, yet they are substantial. We will rely on these standards to demonstrate the effects of interdependencies across risk sources for overall portfolio risk.

We use a simple model composed of five normally distributed risk sources with means of zero and variances of one. The distributions were aggregated homogeneously using the Solvency II correlation values. All of these correlations are positive — that is, they fall between zero and one, and are constant across the distribution. While many interesting

mathematical relationships can be explored, we chose to focus on the effect of aggregation on the 95% VaR. *Figure 1* summarizes our results.

Several interesting conclusions can be derived from these results. First, our intuition for the direction of reduction for VaR through the correlation values is accurate. That is, the more uncorrelated the risks (when, as in this case, considering only positively correlated sources of risk), the greater the reduction in VaR resulting from the aggregation.

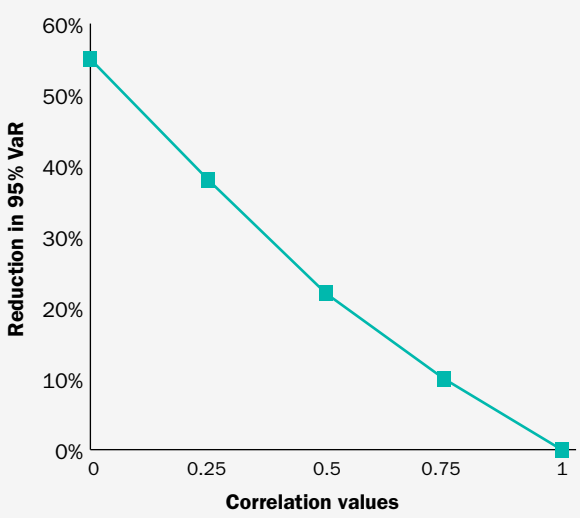
Next, in moving between the two extreme correlation outcomes (zero and one), we observe significant benefits lost in risk aggregation as positive correlations strengthen. The 95% VaR reduces by more than 50% with aggregation of independent risk sources, whereas aggregation of a perfectly positively correlated pair of risk sources yields no VaR benefit.

The 50% VaR reduction achieved through aggregation means that if a referent organization were to hold capital at the 95% level for each of the five uncorrelated risks individually, it would be holding more than twice as much capital as would be necessary. This is best illustrated by an example. Suppose that the organization faced five normally distributed uncorrelated risk situations and that the 95% VaR for each was \$1 million. When viewing each risk independently and holding capital at the 95% level, the organization would need to hold \$5 million in reserves. If instead the risk situations were considered in aggregate, the organization would need to hold just \$2.25 million, freeing up a significant amount of resources for other uses. It is important to note that actual risk would not change; rather, with better knowledge, the decision makers have captured the overall riskiness of the situation more accurately.

We further note that the reduction in VaR does not change linearly with changes in correlation values. That is, if the correlation values were reduced by half, the resulting VaR values would not necessarily be reduced by 50%.

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Figure 1. Effect of risk correlation on VaR



The Broadening of Risk Management

Companies that lag in their ERM efforts tend to focus on insurable and speculative risks separately, representing a more traditional approach to risk management. These companies are not taking advantage of understanding the implicit relationships among their risks and are therefore missing out on value creation. At these companies, risk is considered optimal if each of the business units within the company is optimizing its risk individually.*

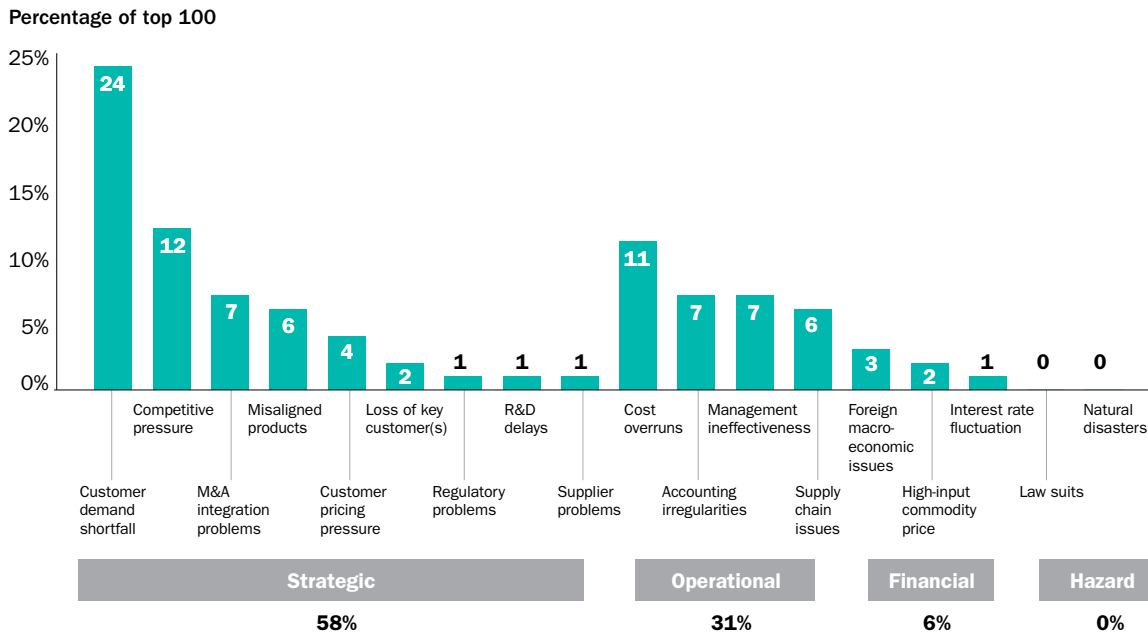
Risk management has broadened its scope in the last few decades to include not only insurable risks, often referred to as “hazard risks,” but also financial and strategic risks, commonly referred to as “speculative risks.” Hazard risks involve only the potential for loss (or, at best, the status quo), while speculative risks may include gain opportunities as well. The most successful risk managers possess the necessary skills to take advantage of the opportunities that can and do arise from management of the full portfolio of risk, both hazard and speculative, in combination.

About 10 years ago, Mercer Management Consulting published a study that focused on the main causes of stock price drops for *Fortune* 1000 companies. The results suggested that neither hazard-related

risks (such as natural disasters and lawsuits) nor financial risks had a significant effect on organizational market value.* Some commentators have suggested that the reason these two risk categories have not been particularly relevant is that companies already employ effective risk management tools to hedge them (including insurance and financial derivatives).** We consider this hypothesis interesting for future research.

The Mercer report also indicates that strategic risks are often the most significant areas affecting firm value. While the results, if tested today, might be different due to events such as the BP oil spill in the Gulf of Mexico and the events surrounding the Fukushima tsunami in Japan,** the point remains that if we focus solely on the traditional hazard and financial risks, we will be missing key areas in which to implement strong ERM processes. Furthermore, we have available various hedging techniques (including insurance) for many hazard and financial risks, while strategic risks are less likely to have available such external sources of risk transfer. Instead, internal efforts toward excellence in planning and execution are required. ERM creates an opportunity for a risk manager to be involved with strengthening firm value by focusing on this broader set of risk situations.

Figure 2. Primary cause of stock drop (number of companies)



Source: Mercer Management Consulting

* <http://www.soa.org/Library/Newsletters/The-Actuary-Magazine/2008/June/act-2008-vol5-iss3-wolf.aspx>

** <http://www.aicpcu.org/MediaCenter/docs/articles/TheEvolutionofRiskManagement.pdf>

*** www.aon.com/attachments/risk-services/Aon-OM-Reputation-Review-2012.pdf for a discussion of recent value-damaging events

Moreover, regulatory bodies in Europe and the U.S. have come to accept the value of ERM and have begun to require its implementation. In Europe, to ensure capital adequacy among financial institutions, regulators, beginning with the implementation of Basel II standards for banks and continuing with the implementation of Solvency II standards for (re)insurers, have mandated that companies operating in these industries harmonize their capital allocation models with the results of their risk-reporting and control measures. This has led European financial institutions to develop some of the more sophisticated ERM processes to date. These regulatory changes have encouraged U.S.-based financial institutions to consider similar changes, anticipating that U.S. regulators may mandate changes similar to those of their European counterparts.

Beyond insurance, the Securities and Exchange Commission (SEC), which regulates U.S. publicly traded companies, instituted accountability requirements in 2009 associated with enterprise-level risk reporting by board members. The mandate arose out of the SEC's determination that the failure of company directors to question their firms' key risks significantly contributed to the financial crisis of 2008. For many companies, this mandate led to board-sponsored adoption of formal processes such as ERM. In 2011, the Risk and Insurance Management Society conducted an online survey* of 1,431 risk managers and found that 34% of respondents cited their board of directors as the primary motivation for implementing ERM, while 18% cited regulation as the primary reason.

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Challenges to Implementation

While ERM offers obvious benefits, the implementation of an ERM program also presents challenges. For example, risk executives participating in the Towers Watson 2012 ERM Survey** indicated challenges in ERM implementation due to the need for cultural changes, improved overall skills in managing risks and trust in the overall quality of economic capital models. To gain our own understanding, we interviewed corporate risk managers and executives from a variety of industries as well as thought leaders in risk management and insurance generally. These interviews yielded the following overarching challenges to ERM implementation, which we expand upon below:

- Definition of ERM
- Data quality and methodology
- Resistance of industry veterans
- Reputation and individual performance of divisions
- Event-driven nature of risk management

Definition of ERM

Although the ERM concept has been a part of professional risk management activity for more than a decade, no universal definition or understanding of the concept has been accepted. For example, Aon, a risk management and insurance brokerage firm with \$11.5 billion in 2012 revenues, defines ERM as “the proactive execution of a senior management-sponsored, entity-wide strategic process of assessing and responding to the collective risks that impact an organization's ability to maximize stakeholder value.”*** Marsh, one of Aon's competitors, with approximately \$12 billion in 2012 revenues, defines ERM differently, stating that ERM is “a structured and embedded approach that supports the alignment of strategy, processes, people, technology, and knowledge with the purpose of evaluating and managing the uncertainties an organization faces as it creates value. An effective ERM framework equips the organization with quality management information to enable risk-aware decisions to be made with more confidence.”**** The lack of clarity regarding what ERM entails makes implementation more difficult. Each firm operates according to its perception of ERM with no established industry best practices.

*2011 Enterprise Risk Management Survey, <http://www.rims.org/Sales/Documents/RIMS%202011%20ERM%20Benchmark%20Survey%20final.pdf>

**www.towerswatson.com/en/Insights/Newsletters/Global/emphasis/2012/2012-Global-ERM-Survey

***Enterprise Risk Management (ERM), April 22, 2013. www.aon.com/belgium/products-and-services/risk-services/enterprise-risk-management.jsp

****Marsh Risk Consulting, Effective Enterprise Risk Management (Emirate of Dubai, United Arab Emirates, 2011) Introduction

Data Quality and Methodology

From our interviews, we identify the single-largest barrier for implementation of ERM processes as the collection of data necessary to model relationships among various risk sources. While many ERM teams have improved their data-gathering abilities in recent years, those improvements are relegated primarily to hazard and financial risks solely and independently. Our discussions with key risk management professionals suggest that most companies have been unsuccessful in gathering data on key risk sources, including difficult-to-quantify strategic risks. Without such data, we are not surprised to find that few organizations have been able to address the management of correlated risk situations. Executives whose companies have achieved an ability to understand the interrelationship of their risks were quick to note that their companies' risk models relied heavily on a variety of assumptions to fill in their data gaps. This heavy reliance on assumptions forced these executives to question the value of ERM and its decision-making capabilities.

Resistance of Industry Veterans

Our interviews suggest that experienced employees within an organization are often resistant to significant organizational change, whether it is due to healthy skepticism of the latest corporate fad or fear of lack of value to their employer. Multiple interviews with company executives found that, even in the ever-changing world of risk management, experienced risk managers were hesitant to think beyond their roles as managers of insurable risks. Of course, as some interviewees mentioned, this may well be because these risk managers were practicing sound risk management techniques. After all, acting conservatively is often the rational choice when facing a high level of uncertainty.

Reputation and Individual Performance of Divisions

Currently, most companies manage risks within business-unit silos, not taking into consideration what risks other parts of the company face. Since most managers are incentivized based upon the performance of their unit, it is no surprise that they are reluctant to give up control over the risks specific to their function. Some of the risk managers interviewed noted that the coordination and ability to get buy-in for ERM processes across the organization were difficult because managers were fearful of damage to their reputation if the ERM processes were not perceived to create value.

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Failed attempts at other companies may have furthered this fear. The risk manager at one large firm chronicled the firm's attempt to implement several different versions of an ERM system. None of those attempts could be tied to value creation due to the complexity of managing and monitoring the system. Continued efforts were perceived to expose the risk manager's reputation to damage, leading to the decision to abandon the project. Development of ERM evaluation mechanisms that focus on process rather than outcome (which will be affected by random, uncontrollable events), and that incorporate top-level support for the ERM effort, will help advance ERM success.

Event-Driven Nature of Risk Management

Risk managers perceived the event-driven nature of their function as a major obstacle, preventing them from focusing on long-term risks, according to our interviews. This tendency, likely driven by what is known in psychology as the Recency Effect (the principle that the most recently presented information is most likely to be remembered), keeps risk managers focused on addressing the latest challenge rather than the long-term well-being of the company. For example, immediately following the terrorist attacks on 9/11, corporate risk managers focused on terrorism and business interruption coverages because those were the risks they had most recently experienced. Likewise, immediately following the economic downturn in the world economy, many companies reallocated significant resources within their risk management departments to focus on financial and credit risk concerns.



Thoughts for the Future

For most companies and institutions with limited risk management resources, improving and managing risk may require the simplest strategies that can be embedded in day-to-day operations easily. Major changes in risk management standards may not only be expensive but also difficult to implement. Successful change is more likely to develop from a methodical, daily, casual transition that involves the people, process, infrastructure and compliance connected to the ultimate goals.

Small Steps First

What we learned from both our research and interviews is that most risk managers with whom we interacted consider current ERM systems to be too complex to identify and prioritize risks effectively and efficiently, let alone to model companies' risk portfolios. Some executives hypothesized that ERM systems might be easier to implement if companies were viewed as an aggregation of several interlinked key risk portfolios. By first managing subsets of company risks as portfolios, these interviewees hypothesized, risk managers might find managing enterprise-level risk portfolios much easier. Even our simple mathematical analysis shows that starting small might lead risk managers to succeed. This outcome is also consistent with the Towers Watson 2012 ERM Survey, which indicated that organizations that first focus on managing individual risk situations well and then move toward overall organizational risk management have the greatest success with ERM programs.

Potential Solutions to Current Data Challenges

Given the concerns of developing quality data to build accurate risk models, some ERM practitioners have begun to wonder if external sources could improve the data-gathering process. One interviewee speculated that regulatory bodies may need to step in to fill many of these data gaps, particularly in industries where

ERM and capital allocation processes are driven by regulatory requirements. Another executive saw these data gaps as a business opportunity for enterprising companies that could simplify the data-gathering and modeling process. In fact, companies are trying to fill in gaps in data. IBM, for instance, has created the Algo First* data set of thousands of operational risk events for the purpose of effective risk management. Other vendors have created similar data sets.

Opportunities for Innovative Risk Financing Products

While the level of understanding of portfolio effects and the mathematical modeling for evaluating risks on a portfolio basis are both in their infancy among practitioners, it is exciting to think about the potential changes that a better understanding of this area could have on risk management generally, as well as the development of sophisticated risk financing products. Among the possible directions are expanded use of captive insurance companies and development of a broader set of multiple-trigger policies.

A captive insurance company is a "legal entity formed primarily to insure the risks of one corporate parent, thereby contributing to a reduction in its parent's total cost of risk."^{***} Because captives are controlled by their parent companies, a captive gives the parent company the control to include unique risks. As companies are better able to identify and anticipate the risks they may face, both traditionally insurable risks and those considered uninsurable, they can make better-informed decisions about including coverage for those risks within their captive. By managing more risk sources within the captive, companies will be able to take greater advantage of the natural hedging that occurs in a portfolio of risks.

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*http://pic.dhe.ibm.com/infocenter/op/v6r2m1f0/index.jsp?topic=%2Fcom.ibm.swg.ba.cognos.OP_ORM_Module_Overview.6.2.1.doc%2Foppm_orm_about-algo-first.html
 **Captive Concept, Marsh & McLennan Companies, 2011

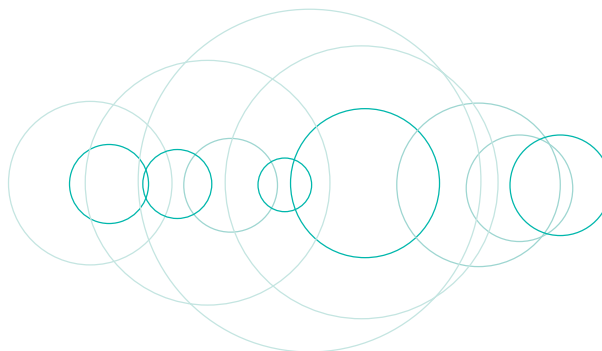
“Successful change is more likely to develop from a methodical, daily, casual transition that involves the people, process, infrastructure and compliance connected to the ultimate goals.”

An alternate method for risk managers to customize coverage and protect against high-severity, low-frequency tail events is the use of multiple-trigger policies. Just as the name implies, multiple-trigger policies require the occurrence of more than one event for coverage under the policy to be available. For example, a utility company could purchase coverage that is “triggered by the simultaneous occurrence of two events: sudden increases in a spot price for a commodity, namely electricity, and the fortuitous loss of generating capacity.”*

Conclusion

The insurance industry has produced impressive financial results by aggregating the broad spectrum of risks of individual insureds, paving the way for noninsurance companies to implement successful campaigns of their own. As a risk management community, we are beginning to recognize the inherent value of understanding and managing risk at a

portfolio level. The current barriers to fully successful ERM programs are neither intellectual nor conceptual, but technological and logistical. Overcoming these challenges may best be done in small steps, testing and signaling the value to the entire organization in order to gain credibility and support. The past decade may not have seen ERM used to the extent managers had anticipated, but progress continues. The foundation is established, and we must act. A holistic approach to risk management is certainly within reach.



*Schober, Lawrence, Pricing Multiple Triggers — An Electrifying Example, Casualty Actuarial Society, April 22

This white paper is the result of an applied learning project in the Risk Management and Insurance MBA curriculum at the Wisconsin School of Business, University of Wisconsin-Madison. In coordination with Towers Watson, students investigated the portfolio effect of aggregating hazard and speculative risks in an enterprise risk management framework. Students conducted the analysis, interviewed risk managers, studied the literature and drafted the paper. Towers Watson provided oversight for the writing of the white paper along with analytical and software support, including use of Igloo, a financial modeling software for businesses.

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