



Risk

Management

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Exciting and Challenging Times for Risk Managers

by Frank Sabatini

Risk management has become one of the hottest topics in the insurance industry. There are many environmental forces at work that have taken risk management and elevated it to an insurance industry priority. These forces create challenges and have implications for us as actuaries and as risk management professionals.

More appropriately, the hot topic is Enterprise Risk Management (ERM), the assessment and management of material risks across the organization. Insurance industry management is seeking to implement enhanced enterprise risk management programs on an accelerated basis. The investments being made are significant and the need for dedicated risk management resources and leadership is great. The need to advance the theory and practical applications of the theory has become an imperative for practitioners. Chief risk officer positions are being created or enhanced. External audiences are beginning to seek greater balance sheet transparency relative to risk.

The impetus for these initiatives can be distilled into just a few environmental factors. The following discussion attempts to present an inventory of those factors and a perspective on their impact on insurance organizations, followed by a discussion of the challenges we as risk management professionals face.

“The Perfect Storm.” Recent capital markets history has not been kind to insurance industry guarantees. We have survived one of the worst bear markets in history, the lowest interest rates in decades and another round of credit events. The equity market performance has heightened company exposures to death and living benefit guarantees and has sensitized management and external audiences to the variability of equity market linked revenue. The level of interest rates and the available supply of investment products continue to make minimum interest rate guarantees an ongoing concern. Conversely, concerns about

a fairly rapid rise in interest rates continue to influence product management and investment strategy decisions. The recent credit cycle has reminded us that credit events can be significant and painful and that they can have a materially different impact on each company depending on their risk appetite and credit risk management practices. These events have heightened the need for enhanced enterprise risk management processes and management actions.

Product Complexity and Sophistication.

The products sold by insurers have evolved to include more meaningful guarantees, frequently but not always leading to the development of risk mitigation programs concurrent with the development of the products. The product guarantees and emergence of risk mitigation programs, especially variable annuity hedge programs, has resulted in increased risk management activity in a nontraditional area. This dynamic is driving management to seek more formal risk management processes.

Regulatory and Accounting Trends.

A consequence of the recent capital markets upheaval and product evolution has led external constituents to “demand” greater transparency and more appropriate recognition of risk on the balance sheet. The regulatory movement that seeks more appropriate recognition of product guarantees on the balance sheet has resulted in product redesign and more frequently the implementation of risk mitigation programs to reduce the need for significant increases in capital or reserves. Accounting pronouncements that similarly seek to value embedded options and guarantees have also driven the need for more refined and formalized risk management processes. These trends toward more appropriate recognition of risk on the balance sheet and in assigned capital are expected to continue and directly influence the need for more robust and comprehensive risk management processes.



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Demands of External Constituencies. The environment has created a reaction from the analyst and rating agencies causing them to seek greater comfort with the amount of risk on the balance sheet and comfort that the company has an effective enterprise risk management process for identifying, quantifying and managing risk. It appears that the quality and effectiveness of the enterprise risk management process of a company will have an increasing impact on ratings or analyst views. The recognition that this factor has increased in importance has motivated the need to ensure effective enterprise risk management processes.

More Than Financial Exposure. Recent nonfinancial/operational risk events such as market conduct based litigation, the mutual fund trading scandal and the Spitzer-related events have increased the awareness and need for more effective and disciplined operational risk management processes within the industry.

Gaining a Competitive Edge. There is growing sentiment that effective enterprise risk management processes can be used to gain a competitive advantage. Part of this thinking is driven by a belief that the aggregate risk position is lower than the amount of risk reflected on the balance sheet through reserves and capital. This view is also advanced by the recognition that many of the risks assumed by organizations are not highly correlated and the benefits of balance sheet diversification are not reflected.

Management Wants to Know. The shift in the industry's product mix over the last 20 years has changed the nature of the balance sheet so that the amount of interest and equity-based risk, exposures to options and guarantees and policyholder behavior are substantially greater today than before. Management recognizes that it needs to understand the risk inherently resident on the balance sheet and be able to make decisions regarding the acceptable level of risk across the enterprise. This desire to have more definitive risk profile information and fact based decision-making capabilities is also contributing to the need for enhanced risk management activities.

Each of these factors, plus others I have probably failed to mention, is driving the need for en-

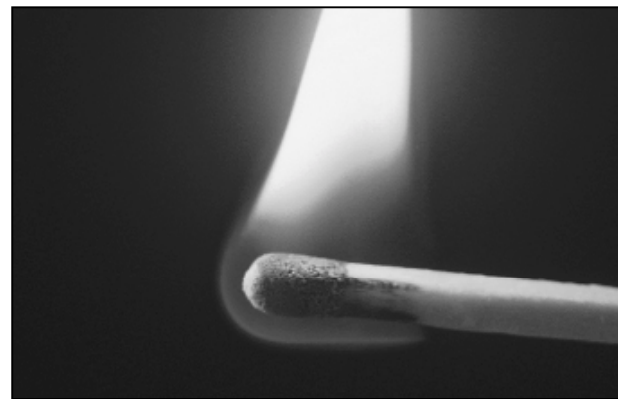
hanced risk management processes within companies. The momentum is significant, yet the challenges are not small and the opportunity for risk management professionals to provide leadership and contribute in a meaningful way is almost unbounded.

Almost all of the challenges we face are implementation related.

Standardized Measurement Framework and Methodology.

Risk management as applied to insurance enterprises is not nearly as well defined nor understood as we would like. It is certainly not standardized. We seek common metrics and measures, even within our own organizations. The goal is to identify and quantify each of the major risk elements on a consistent basis across all risk elements: interest rate and equity market, credit and operational risk and across all businesses both insurance and non-insurance. Today, it is difficult to make statements about the relative amounts of risk contained on a balance sheet, in part because many of the components utilize different measurement systems. Our challenge in each of our respective organizations is to identify that common framework and methodology. These initiatives are underway in many different venues.

Technology Enablement. Another challenge relates to the technology and software infrastructure that is needed to support insurance company enterprise risk measurement programs. Measuring risk for insurance products is not trivial. For financial risks we have historically built and maintained models that project cash flows and accounting-based elements at a fairly granular level. The combination of granularity and accounting frameworks have made the computational problem extremely time consuming at best. Many companies, in addressing risk management implementation issues, are devoting resources to the technology side of the problem, seeking to use emerging technology to reduce computational run time. An alternative approach is to seek less granular and/or more approximate approaches. This idea probably needs greater attention than it has received in the past.



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Risk Management Section Business Plan

by Frank Sabatini

In November 2000, the SOA initiated the process of developing a strategic plan as well as providing recommendations for organizational alignment to this plan. The Strategic Plan was approved in 2001 and efforts began to address the long-term growth and vitality of the profession later that same year. In October 2003, several motions were taken to the Board of Governors for approval, as a result of follow-up studies and surveys that were undertaken as part of the implementation of the plan.

In result, the SOA Strategic Plan was updated for 2004-2007. One of the outcomes of the updated plan was a review of the roles of the sections and practice areas. A major goal of this review was to develop an organization, which could generate broader membership input and to use that input in delivering value to the membership and the profession through the SOA's strategic plan. It was felt that the sections already had established a greater connection with their members and had a grassroots network in place for communicating and reacting to members' needs. Thus, the recommendation was made to eliminate practice areas and let the sections absorb the responsibilities formerly held by the practice areas.

As part of this reorganization, it would be critical to:

- Determine a process and/or organization that would use both section and SOA resources more effectively and efficiently.
- Redistribute and transition practice area assets (perspectives, projects and resources) to ensure the value they add is not lost.

Under the new strategic plan, the SOA is moving to a membership-focused business model. One of the advantages of the current section structure is that the sections are already membership-focused entities. Consequently, the SOA would like to build on that advantage and give the sections even more opportunities to have an impact on members and the organization.

Thus, the role of the sections going forward will be expanded over and beyond what they have been used to in the past. With the additional responsibilities will come additional SOA resources (people and financial) and hopefully additional efficiencies across all sections.

This new section role can be broken down into four major function categories, which roughly correspond to the "themes" of the SOA Strategic Plan:

<u>Section Function Category</u>	<u>SOA Strategic Plan Theme</u>
Provide a Grassroots Community	1. Membership Value
Propose Content for Basic and Continuing Education	2. Knowledge Management
Identify and Manage Research Scope	3. Marketplace Relevance
Connect to Strategic Direction	4. Professional Community Advancement

Within each of the four major categories, there are further breakdowns, which identify additional specificity as to the section activities. The graphic on page 5 illustrates this breakdown.

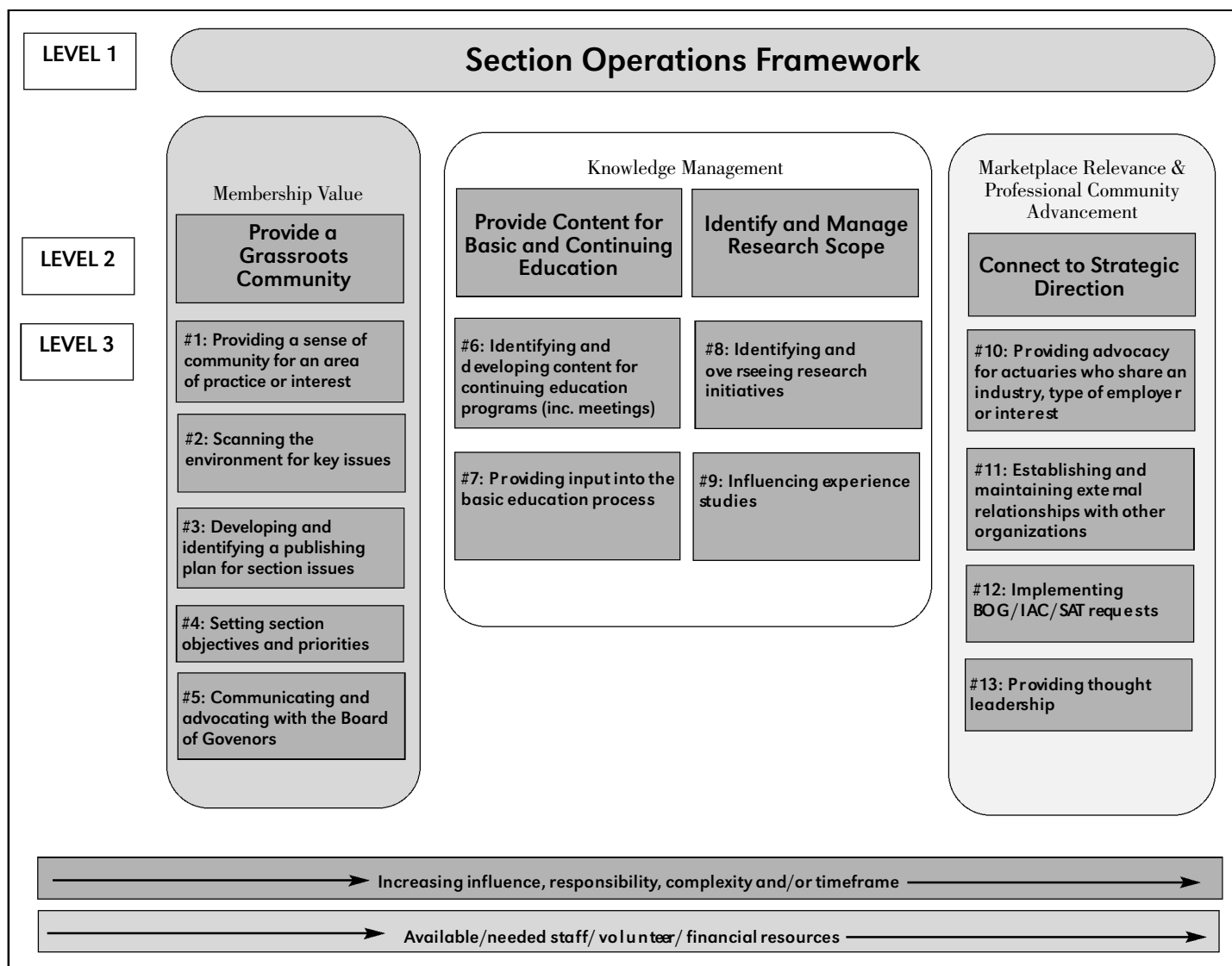
In adopting this new framework, the Risk Management Section has developed an organizational structure and business plan. This article provides an overview of the section business plan and requests your continued involvement in achieving these objectives.

The section's primary objectives for the current year can be summarized as follows:

1. Increase the level of communication and interaction with section members.
2. Expand the educational enterprise risk management opportunities for section and SOA members especially in areas where we have not traditionally had training such as operational risk and credit risk.



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- Continue to foster risk management research.
- Support the Society's initiatives in promoting the actuarial profession as risk managers.

Communication & Publications
 Newsletter
 Continuing Education

Bev Morgolian
 Ken Seng Tan
 Hubert Mueller

The section has organized as follows with Section Council responsibility for each of the major areas of activity:

Section Team	Team Coordinator
Professional Community Advancement	David Ingram
Marketplace Relevance Risk Management	Doug Brooks Fred Tavan
Research	
Basic Education	Shaun Wang
Membership Value	Open

Each of these teams is newly formed and we continue to seek more member involvement in each of the teams. Please contact any of the section council members if you have an interest in working on one of the teams.

At the end of the article is a graphic illustrating the Section Team organizational structure.

What follows is a discussion of our 2004 – 2005 business plan by team and activity.

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Risk Management Section Business Plan

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Provide Grassroots Community

Providing a Sense of Community for an Area of Practice or Interest. The primary way in which the section fulfills this role is through communications with its members. The following activities have been the primary basis and means of communication in the first year of the section's operations.

- SOA Annual Meeting Breakfast
- *Risk Management* Newsletter
- Risk Management Section Research Activities

During the coming year, the section seeks to begin a broad based outreach program for its members by continuing to promote the activities currently used (outlined earlier in this article) and by leveraging the focused roles within the section council and the use of a broader base of the membership to initiate the following activities:

- Active promotion of member involvement in section activities.
- Webcasts on topics of member interest (includes sessions where the council would be reporting out to members).
- (Monthly) blast e-mails.
- Membership survey (priority for early 2005).
- Promotion of research and CE activities of the section.
- Incorporation of the Risk Management Task Force Web site into the Risk Management Section Web site (priority for early 2005).

Other initiatives and the prioritization will be identified by the membership team and its section council member leadership.

Scan the Environment for Key Issues. This is one area where the section has been involved on a somewhat informal basis but has been a significant effort as reflected by the various research activities underway. However, the emphasis will need to be increased going forward. The practice areas have had this activity as one of their major roles, and it will need to be more formalized and enhanced under the section's new role. The results of this activity will also feed into the SOA's environmental scanning process, used by the SOA Board to plan, prioritize and act on issues for the entire profession.

Included in this activity are identifying issues that are current or on the horizon, which can have an impact on risk management professionals and the way in which they will need to perform their jobs in the future.

The following formalized initiatives are proposed for 2004- 2005:

- Routinely seek direct input from members to identify issues (e.g., via survey).
- Creating and maintaining an emerging and key issues list.
- Incorporate environmental issues in the newsletter and other communications with members.
- Incorporate environmental issues as a fixed topic for section calls and meetings.
- Flow the environmental issues into other activities (e.g. CE, newsletter, Web site, etc.)

Develop and Identify a Publishing Plan for Section Issues. This activity should be issues-driven (not outlet driven). Determining the best media for communicating important issues to members is the objective for this activity. Currently, technical topics as well as current events are addressed only via *Risk Management*, the newsletter of the section. The newsletter is currently published on a quarterly cycle.

Additional 2004-2005 specific initiatives are:

- Risk Management Section Web site redesign (incorporating Risk Management Task Force's Web page).
- Establishing additional outlets for section issues, such as *GARP Risk Review* magazine, *Financial Engineering News*, other organizations' publications, *The Actuary*, other sections' newsletters, *Compliance Week*, *Wall Street Journal*, broader financial services publications, personal interviews, etc.

The section will seek to develop additional publishing plans. These plans could include more frequent reporting and publication around the many section research activities.

Communicating and Advocating with the Board of Governors. To insure that the objectives of the SOA Strategic Plan are met, there must be two-way communications between the section and the Board of Governors. The communication plan must involve a process for communications from the section up to the BOG (status of initiatives, request for support, etc.) as well as

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To insure that the objectives of the SOA Strategic Plan are met, there must be two-way communications between the section and the Board of Governors.

”

communications from the BOG down to the sections (projects, issues that need to be addressed by the section). The communication process needs to be formalized, frequent and two-way.

The proposed tentative plan is to:

- Produce periodic section-written status reports to the BOG following the established Board reporting format (4-section report: a.) accomplishments, b.) important current activities, c.) expected accomplishments/priorities in the upcoming months, d.) challenges/assistance needed.
- Work with the BOG member-liaison to the Risk Management Section proactively.
- Send a Section Council representative to Board meetings.

Provide Content for Basic and Continuing Education

Identify and Develop Content for Continuing Education Programs. The section currently is very active in defining continuing education content as part of the SOA Spring Meeting, Annual Meeting, Valuation Actuary Symposium and Enterprise Risk Management Symposium. These sessions have been well received and we plan to continue to aggressively provide high quality content at these meetings. Our Spring Meeting sessions include the use of a seminar format.

In addition to meetings, the section has the opportunity to sponsor seminars during the year, geared to topics of current interest by its members as well as initiate/participate in the co-sponsored or jointly sponsored arrangements with other risk management (non-actuarial) bodies. The section also has the opportunity to sponsor webcasts throughout the year dealing with current risk management topics.

The section's educational focus for 2004-2005, pending additional direct input from the membership, is on topics that are not traditional areas of practice for actuaries such as operational and credit risk management.

Section plans for 2004-2005 call for the potential participation of the section in the following activities (either as a leader or participant):

- Enterprise Risk Management Symposium (section-specific program with involvement of external organizations).

- Credit risk management for life insurance companies.
- Operational risk management for life insurance companies.
- Measuring risk.
- International Actuarial Association meetings.
- Other co-sponsored and jointly sponsored initiatives.
- Other stand-alone seminars or topic-specific events by the Risk Management Section.
- Regional seminars/meetings tour of local actuarial clubs with risk management topics/ presentations).

Section plans also call for the use of webcasts to expose topics of current interest to members. This communication vehicle will be used to discuss topics that lend themselves to a narrower focus with broad appeal to the membership. Examples of possible topics are:

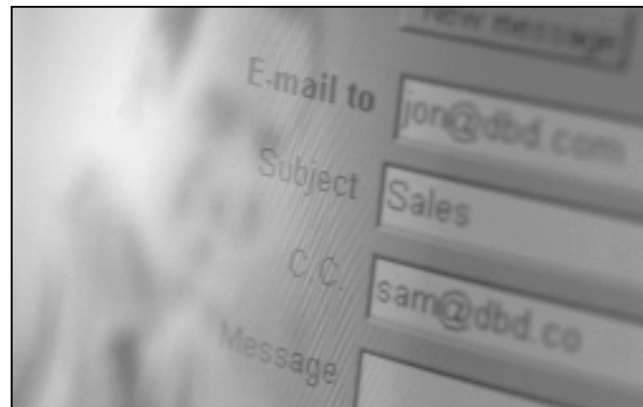
- Potential operational risk issues for the life insurance industry.
- Responding to terrorism.

The Continuing Education Team will refine and finalize plans for 2004-2005.

Provide Input into the Basic Education Process. This involves providing input to the Education and Examination Committees for all tracks (including ERM track) as to topics related to risk management that should/should not be on the examination syllabus. The role here is one of providing input rather than in policy setting.

One way to address this new role may be to set up a regular process of:

- Reviewing the current examination syllabus for risk management topics.
- Identify topics not currently on the syllabus which would be advantageous to include and topics currently on the syllabus that may not be current or appropriate.
- Formalize the section's recommendations.
- Help E&E recruit experienced volunteers.
- Set up a process for meeting with the Education and Examination Committees on a regular basis. These meetings could serve two purposes: a.) one would be to review suggestions provided by the section, b.) the other would be to obtain status of any developments



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Risk Management Section Business Plan

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that are impacting the examination process and/or syllabus and report back to the section.

The Basic Education Team will finalize the activities and any specific objectives for 2004-2005.

Identify and Manage Research Scope

Identify and Oversee Research Initiatives. The section's roots can be traced to the Risk Management Task Force. The subgroups of the Risk Management Task Force have become task forces of the Risk Management Section. The section's responsibilities are to:

- Identify new research opportunities/cutail those task forces whose activities/goals have become stale or irrelevant.
- Support the task forces in their efforts by providing funding and assisting in recruiting volunteers.
- Promote research efforts with the membership.
- Promote research efforts with interested parties outside the profession.
- Assist in the development of papers documenting the results of the research.

The table below shows which Risk Management Task Forces are currently active.

<u>Research Committee</u>	<u>Committee Chair</u>
ERM	Jenny Bowen
Extreme Value Models	Tom Edwalds
Health (with two subgroups)	John Stark
a) Health RM Specialty Guide	Rajiv Dutt
b) Health Solvency	Trevor Pollitt
Policyholder Behavior in the Tail	Jim Reiskytl
Risk Metrics	Fred Tavan
Risk Tolerance (CAS)	Larry Johnson
RBC Covariance	Jim Reiskytl
Pricing for Risk	Novian Junus
Integration of Risk Models (NEW)	Ken Seng Tan
Standard Risk & Risk Management Terms (CAS)	
Operational Risk Management (CAS)	Mark Veheyen
Credit Risk (Investment Section)	David Ingram

By scanning the environment for key issues, even more research opportunities should become apparent. Finally, our 2004-2005 plans call for active promotion of our research activities and will solicit input from the membership for new research topics and participation in research activities of other organizations.

The research team will further refine the 2004-2005 plan.

Experience Studies. As a new section, we have no historical experience studies nor did the section inherit studies formally conducted by the practice areas. It is possible that there will be no such need in the near term. The research team will consider the need for experience studies in 2004-2005.

Connect to Strategic Direction

Provide Advocacy for Actuaries. The objective is to ensure the activities of the SOA promote the interest of the section members within the Society, the actuarial profession and externally. The major focus is promoting actuaries as risk management professionals. However, since the Risk Management Section membership includes non-actuaries, the focus might be split to serve both member categories. The following activities are proposed:

- Coordinate with the image campaign, working with the Marketplace Relevance Strategic Action team and the Image Advisory group of the SOA.
- Market research on ERM/risk management.
- Career encouragement in risk management for those members who are interested in developing nontraditional skills.
- Promote section seminars to nonmembers.
- As section research is completed, publish the findings in a manner that actively promotes the actuarial profession (broad marketplace distribution).

The Marketplace Relevance Team will develop a refined plan of action designed to further the actuary as the risk management professional's brand.

Establish and Maintain External Relations with Other Organizations. The goal is to enhance opportunities for section members and increase the visibility of section within the risk management profession. In addition, the section members practicing in different industries will benefit from the richness of a multidisciplinary

approach to research, meetings and issue identification. The primary objective is to increase awareness of section activities.

The section has existing relationships with a number of organizations. This plan seeks to enhance, expand and *institutionalize* those relationships. In addition, new relationships will be explored. Each of these relationships will be approached with the objective of enhancing the brand of actuaries as risk management professionals and providing enhanced educational opportunities for all section members.

The section is contemplating the following activities:

- Establishing liaisons/links to other areas of practice (health, pensions, casualty).
- Identifying those external organizations where the benefits and the relevance to our interest are the greatest, including international actuarial bodies and international academia.
- Seeking to establish relationships with those organizations (leadership meetings, co-sponsored/jointly sponsored events, cross-promotion, etc.).
- Seeking to make use of non-actuarial representatives from these organizations.
- Working to maintain an ongoing relationship where the communication and flow of information becomes routine.

The Marketplace Relevance Team will develop a more refined 2004-2005 plan that will provide guidance to the relationship managers. If possible, we should seek relationship managers that are also members of the targeted organization, possibly assigning a section member with responsibility for managing this relationship. We anticipate relationships with the following organizations:

- | | |
|-------|-------------|
| PRMIA | GARP |
| CFA | IAA/AFIR |
| IAFE | Joint Forum |
| RMA | RMS |

Provide Thought Leadership. This activity is intended to guide the future longer-term direction and agenda for the section by responding to key external issues and the changing environment. Implementing some of the other section functions, particularly scanning the environment for key issues and publishing our research findings, are ways that we can provide thought leadership. A key component of this activity is the dissemination of thinking to the membership and the risk management community at large.



Active Recruitment of Non SOA Members. In keeping with our objectives, the Professional Community Advancement Team will identify activities designed to qualify and then solicit member from outside the actuarial profession, who have an interest in risk management and/or work as risk management professionals.

The section council, with its “advisors’ and “friends of council,” is primarily responsible for this activity, possibly assigning requests for implementation to other section members/teams, if deemed necessary.

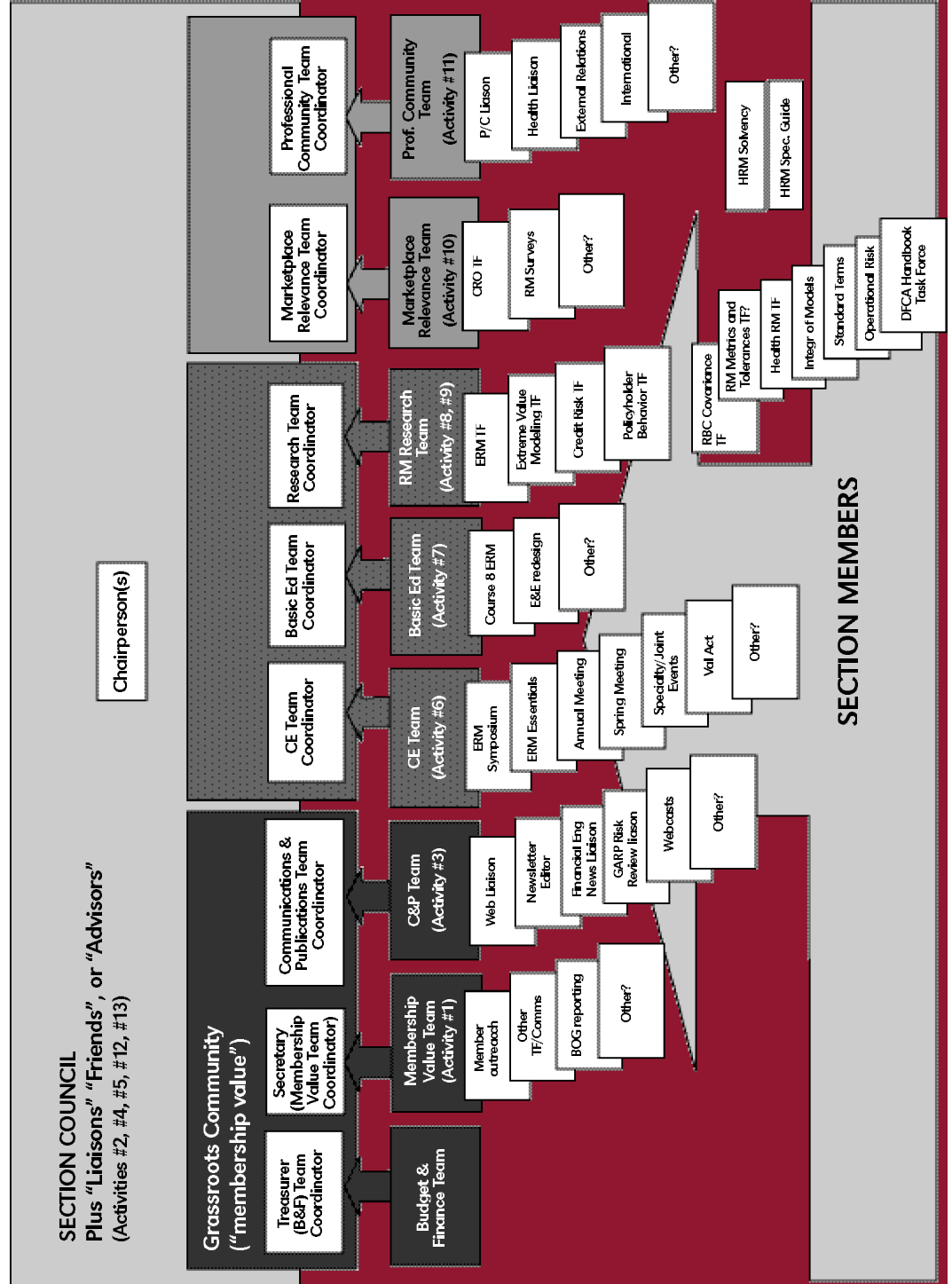
This plan is aggressive and needs the active involvement of the membership to realize many of these objectives. We are encouraged by the level of interest in the section and the member involvement to date. If in the course of reading this article you find an area in which you would like to assist please contact any of the section council members.

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Risk Management Section Business Plan

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Risk Management Section Organizational Design



Risk Aggregation for Capital Requirements Using the Copula Technique

by Song Zhang

In order to determine the appropriate amount of capital for an organization, risks must be aggregated appropriately to reflect the non-normality of individual risks and non-linear dependence among risks, particularly in the tails of risk distributions.

The regulatory capital requirement for life insurance companies in Canada - Minimum Continuing Capital Surplus Requirement (MCCSR), which is equal to the sum of capital requirements for individual risks, implicitly assumes individual risks are perfectly correlated. Modifications to the MCCSR approach, such as risk aggregation by applying a correlation matrix (we will call it Correlation Matrix approach thereafter), only address these issues to a limited extent. In particular, it may overstate the benefits of diversification, as correlations are assumed to apply in the tails of risk distributions. This is potentially a dangerous assumption, as observable correlations may easily break down in the types of scenarios that exist in tail situations.

The Copula technique that aggregates risk components via a multi-uniform distribution has become the most significant new technique to handle these challenges. It allows us to exploit marginal distributions of individual risks at the first step, where non-normality of the risks is addressed, and provides us a comprehensive modelling tool that can reflect the dependence in a very flexible way in the second step.

In this article, we start with a brief overview of the MCCSR approaches and Correlation Matrix approach. Secondly, general introductions of the Copula technique are provided. We then elaborate on one type of popular Copula that has good application in risk aggregation for capital requirement purpose, t-Copula. Gaussian Copula is also briefly discussed. Finally, a numerical example is provided.

MCCSR and Correlation Matrix Approach

The total MCCSR requirement is determined by multiplying a risk measure for each risk compo-

nent by the corresponding risk factor, and adding up these products. Except within life insurance mortality and morbidity risk, where there is a modification for company size, there is no explicit recognition of the diversification among risks, and risks are implicitly assumed to be perfectly correlated.

The Correlation Matrix approach is similar in spirit to the U.S. Risk Based Capital (RBC), where correlations are assumed as either 0 or 1. This explicitly takes the correlations into account. In general, if we denote the capital requirement for risk component i as A_i , and the correlation coefficient between risk components i and j as ρ_{ij} , then the corresponding total capital requirement is

$$\sqrt{\sum_i \sum_j \rho_{ij} A_i A_j}$$

An implicit assumption in this approach is either that the risks follow a multi-normal distribution or the capital requirements are a multiple of the standard deviations of the risks. However, insurance risks and investment risks often depart from these assumptions, and the risk-measures become less effective. Furthermore, the non-linear dependence among risk factors is not addressed.

Copula

An n -dimensional Copula- C is an n -dimensional distribution function with Uniform marginal distributions. The dependence structure between the risk X_i is described by C if the joint cumulative distribution function (Cdf) F of $X_1 \dots X_n$ is given by,

$$F(X_1, \dots, X_n) = C(F_1(X_1), \dots, F_n(X_n)),$$

where F_i denotes the marginal Cdf of X_i . In other words, the joint distribution of $X_1 \dots X_n$ is given by the function C . Since Copulas describe the dependence between variables on the level of quantiles, the same Copula can be applied on any non-decreasing transformation of the original risk measure, and linearity is not necessary.

A very important concern of risk aggregation for capital requirement purpose is the joint



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Risk Aggregation for Capital Requirements Using the Copula Technique

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probability of extreme quantile adverse events, i.e., tail dependence. Note that tail dependence is a quantile measurement determined by the order statistics of the risks as opposed to the actual amount of the risks, and a linear relationship is not assumed. At the same time, we would like to be able to feed in a correlation matrix of the risk factors. The t-Copula is a very popular Copula that meets all these requirements. Properties of the t-Copula along with a brief discussion of Gaussian Copula are presented in the next section.

T-Copula and Gaussian Copula

The dependence of a t-Copula parameterized by a correlation matrix and an additional parameter V to control the tail dependence is implemented through the Cdf of a multi-t distribution with a degree of freedom of V . Note that even though the dependence of individual risks is governed by the multi-t distribution, the marginal distributions of individual risks can be of any forms, and are not restricted to t distributions. The procedure of implementing a t-Copula is as follows:

- Generate a multi-t distribution Y_1, Y_2, \dots, Y_n with correlation matrix R and degree of freedom V as $\sqrt{V/S} * (Z_1, Z_2, \dots, Z_n)$, where Z_1, Z_2, \dots, Z_n are multi-normally distributed with correlation matrix R and S is a random variable with χ^2 -distribution. The marginal distribution of Y_i is denoted as t_v .
- Let $u_i = t_v^{-1}(Y_i)$, then u_i follows a Uniform distribution in $(0,1)$.
- For each risk component i , let $X_i = F_i^{-1}(u_i)$ where F_i denotes the marginal Cdf of X_i , then $X = \sum_i X_i$ is the total risk.

According to the procedure just described, as long as S is small/large enough, Y_1, Y_2, \dots, Y_n could all be at the high/low ends of their distributions (i.e. tail dependence), even though Z_1, Z_2, \dots, Z_n are not. Moreover, the smaller the V , the fatter the tail of S is, and therefore results in higher chance of extreme values for S . As a result, everything else being the same, smaller V results in stronger tail dependence.

The limiting case of V equal to positive infinity is the corresponding Gaussian Copula, where the dependence among risks is reflected using a multi-Normal distribution. It has been shown that when the risks are not perfectly correlated, the tail dependence of a Gaussian Copula is 0. Therefore, this type of copula is not very effective in modeling the dependence of extreme adverse events.

Example

The application of t-Copulas and the comparison with other approaches are illustrated using a numerical example in this section. Artificial data is used across this example.

The overall risk is assumed as the sum of the seven risk components as follows:

- Equity risk (Eq)
- Interest rate risk (Int)
- Credit risk (Cred)
- Morbidity risk (Morb)
- Lapse risk (Lapse)
- Mortality risk (Mort)
- Operational risk (Oper)

The empirical distributions of individual risks were generated from combinations of common distributions such as Uniform, Lognormal and Exponential. In practice, they can be modelled using separate modules.

Mortality risk for life insurance policies is commonly considered to be uncorrelated with the other risks. Operational risk is assumed as constant and additive (i.e., perfectly correlated) with the other risks. The assumed correlation matrix is presented in Table 1 on page 13.

The parameters of a Copula can be estimated using a Canonical Maximum Likelihood Estimator (CML), which is essentially a Maximum Likelihood Estimator (MLE) given the empirical distribution of each risk on a stand-alone basis (i.e. empirical marginal distribution). Sensitivity testing and conservatism would be required when data is scarce.

The capital requirement level is set in the range from conditional tail expectation CTE(99) to CTE(99.9) of 10,000 simulations, where CTE(Q) is calculated as the average of the worst (100-Q) percent of the results from stochastic simulation¹. We also define the correlation benefit as the difference

¹ The CTE approach provides a more stable result than simply selecting a "percentage of scenarios" coverage approach (i.e., a quantile measure). This is because the CTE measure uses an average of all scenario results beyond the selected point, while the percentile approach by definition selects a single scenario to establish amounts.

“ It has been shown that when the risks are not perfectly correlated, the tail dependence of a Gaussian Copula is 0. ”

between the total capital requirement and the sum of capital requirements attributed to the individual risks divided by the sum of capital requirements attributed to the individual risks.

The total capital requirement under the MCCSR approach is essentially the sum of the capital requirements attributed to the individual risks, so the correlation benefit under the MCCSR approach is 0. The correlation benefits under the Correlation Matrix approach, t-Copula with V equal to 1, 5 and 10, along with the corresponding Gaussian Copula are presented in Chart 1.

Compared with the Gaussian Copula and t-Copulas, the correlation benefit is overstated under the Correlation Matrix approach.

The correlation benefits from the t-Copulas are lower than that of the corresponding Gaussian Copula, and the t-Copulas converge to the corresponding Gaussian Copula as the V increases. For example, the correlation benefit under the Gaussian Copula at CTE 99.9 is 23 percent, and is 9 percent, 18 percent and 21 percent for the corresponding t-Copula with V equal to 1, 5 and 10 respectively. The pattern is consistent with the theory that tail dependence of a Gaussian Copula approaches 0 when the risk components are not perfectly correlated, whereas given the correlation matrix, the tail dependence of a t-Copula decreases with the degree of freedom V .

In summary, total capital requirements and correlation benefits are very sensitive to the approach taken and the corresponding parameters. Furthermore, the sensitivities increase with the level of capital requirement approaching the tail of the distribution.

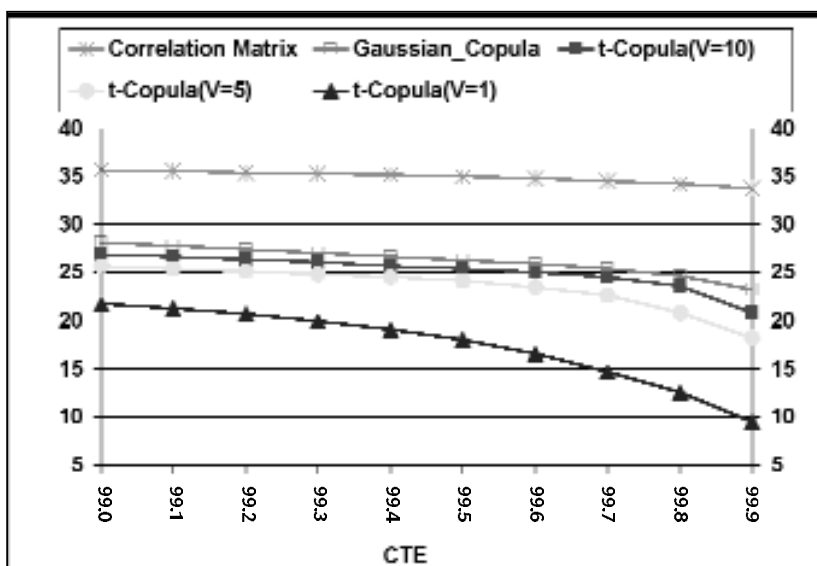
Conclusion

The MCCSR and Correlation Matrix approaches fall short of the need to appropriately reflect the non-normality of individual risks and non-linear dependence among risks when determining the total capital requirement for an organisation. The MCCSR approach, assuming perfect correlation of risks overstates total risk, while a Correlation Matrix approach may overstate the benefit of risk diversification. Copula techniques enable the task of specifying the

Table 1—Correlation Matrix

	Int	Eq	Cred	Morb	Lapse	Mort	Oper
Int	1.00	0.25	0.75	0.25	0.25	0.00	1.00
Eq		1.00	0.75	0.25	0.25	0.00	1.00
Cred			1.00	0.10	0.10	0.00	1.00
Morb				1.00	0.10	0.00	1.00
Lapse					1.00	0.00	1.00
Mort						1.00	1.00
Oper							1.00

Chart 1—Correlation Benefits



marginal distributions of individual risks to be decoupled from the dependence structure of risks, so that the non-normality of individual risks and non-linear dependence among risks, especially in the tail end, can be modelled effectively. However, caution should be exercised in selecting appropriate Copulas and the corresponding parameters so as to properly reflect the dependency among risks, and sensitivity testing is strongly recommended. ♦

Economic Capital in the Limelight

by Hubert Mueller and José Siberón

Note: This is an updated version of a similar article written for the Journal of Financial Regulation and Compliance published in November 2004.

“**E**conomic Capital (EC) is in—Value at Risk (VaR) is out!” This statement by James Lam, well known to be the first chief risk officer (CRO) worldwide, at the 2004 Enterprise Risk Management (ERM) Symposium in Chicago, caused quite a reaction by the attendees.

What is EC? Why are banks and insurance companies focused on calculating EC? What are the differences between EC and regulatory or rating agency capital? What are rating agencies' views towards EC? This article, summarizing a panel discussion on this topic which was held at the ERM Symposium in Chicago in April of 2004, attempts to answer these questions, focusing on the application of EC to life insurance companies.

Background

EC is the amount of capital that banks and insurance companies set aside as a buffer against potential losses from their business activities. For banks, “Basel II” supervision has provided increased incentives for developing and managing their internal capital on an economic basis.

Similarly, the proposed “Solvency II” regulation of the International Actuarial Association (IAA) requires insurance companies to develop their solvency capital using a three-pillar approach:

- Pillar 1 defines a set of target capital requirements necessary for ascertaining companies' financial solvency.
- Pillar 2 includes a supervisory review of the capital models in place—this will particularly apply to proprietary models set up to develop EC (as compared to formula-based approaches).

- Pillar 3 will establish market disclosure measures intended to serve as best practices.

All types of risks are to be included, covering both financial and nonfinancial (operational) events. Under the proposed regulation, companies that are able to demonstrate sound risk management practices (e.g., including the hedging of tail risks) can expect to benefit by having lower capital requirements.

In North America, insurance companies' capital has come under increased scrutiny as of late. The recent bear market and a drop of interest rates to levels not seen since the 1960s have led to dramatic falls in investment income. The quest for higher yields has led insurers to invest in riskier fixed income assets, leading to a record level of realized capital losses in 2002. As a result, many insurance companies have seen downgrades in their financial strength ratings over the last two years.

At the same time, U.S. regulatory bodies are introducing new capital and reserving requirements for life insurance and annuity products with equity guarantees that will lead to increased pressure on capital. Given this background, it is not surprising to find a growing number of life insurance companies paying greater attention to calculating the appropriate level of capital for their business and risk profile.

Calculation of Economic Capital

First of all, we need to distinguish EC from regulatory or rating agency capital. EC is based on calculations that are specific to the company's risks, while regulatory or rating agency capital formulas are based on industry averages that may or may not be suitable to any particular company.

In North America, EC is typically defined as “sufficient surplus capital to cover potential losses at a given risk tolerance level and over a specified time horizon.” This is illustrated in Figure 1.



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There are various methods for determining economic capital. A common methodology is to base EC on the probability of ruin. Probability of (statutory) ruin is the probability that liabilities will exceed assets on a present value basis at a given future valuation date, resulting in technical insolvency. It can be calculated from the probability density function of the present value of future surplus by measuring the area under the curve corresponding to the section where liabilities exceed assets. This is shown in Figure 2 as the shaded area, and is consistent with the Conditional Tail Expectation (CTE) measure defined below. Alternatively, it can be calculated from the cumulative distribution function shown in Figure 1 by determining the probability point (on the y-axis) where liabilities equal assets (on the x-axis). This is consistent with the “specified percentile” approach described earlier. These probability graphs are generated by running computer simulations of liabilities and assets using a stochastic financial model.

Economic capital based on the probability of ruin is determined by calculating the amount of additional assets needed to reduce the probability of ruin to the probability target specified by management. The target probability of ruin is set by management in consideration of several factors, primary among them the solvency concerns of policyholders—usually expressed in terms of the minimum financial strength rating that management desires from the rating agencies.

Recent Market Trends

There is plenty of evidence for the increased use of EC in the North American insurance industry:

1. A survey conducted by the EC subgroup of the Risk Management Task Force in the fall of 2002 found that 45 percent of respondents had used the concept of EC in their work. Most respondents to the survey agreed that EC should cover various types of risks, including:
 - Interest rate risk (96 percent)
 - Pricing risk (93 percent)
 - Credit risk (92 percent)
 - Equity market risk (91 percent)
 - Liquidity risk (86 percent)
 - Operational risk (79 percent)

Figure 1—Determining Economic Capital

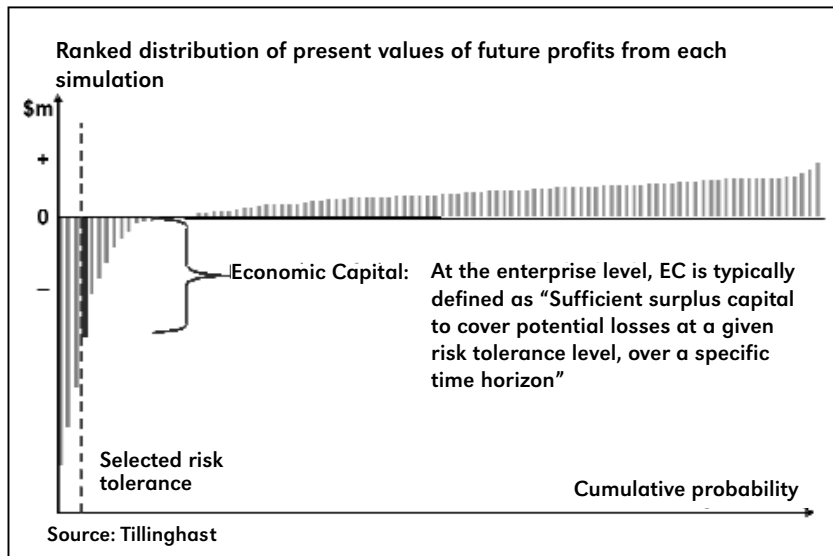
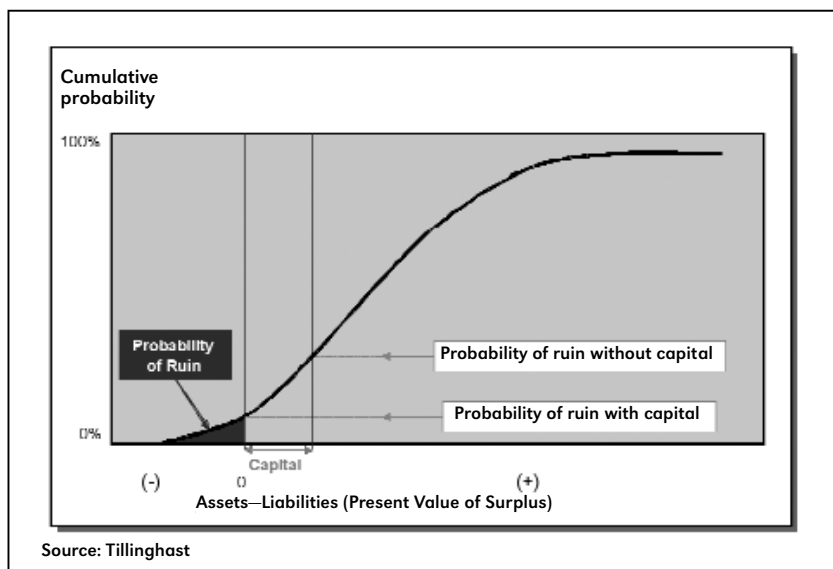


Figure 2—The Probability of Ruin can be calculated from the probability density function by measuring the area under the curve corresponding to the section where liabilities exceed assets on a present basis.



The Basel II EC framework for banks establishes minimum required capital for operational risk. It is interesting to see that this type of thinking is also finding its way into the insurance world. In contrast to banking risks, insurance company risks tend to have much longer terms, in some cases going out more than 40 years. Hence, most companies are still preoccupied with getting financial risks right, rather than focusing too much on operational risks.

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2.) According to an audience poll at a 2004 seminar sponsored jointly by Tillinghast and the Society of Actuaries (SOA), almost 60 percent of respondents have been calculating EC on a total company or a line of business basis. Of the remainder, 24 percent plan to do so within the near future (see Figure 3).

The main reasons for companies implementing EC to date have included risk and performance measurement. Going forward, we expect the impetus to come more from competitive forces and rating agency pressures. A majority of survey participants expect EC to have even greater significance in the near future.

3. The results of the 2004 Tillinghast Global ERM Survey demonstrate how important and widespread EC has become in the global insurance industry. An overwhelming majority of respondents, in fact, state that they either use or plan to use economic capital to improve capital allocation and risk-based decision making. Specifically, 53 percent of respondents are currently using economic capital as a critical decision-making tool, and 28 percent plan to do so. This parallels

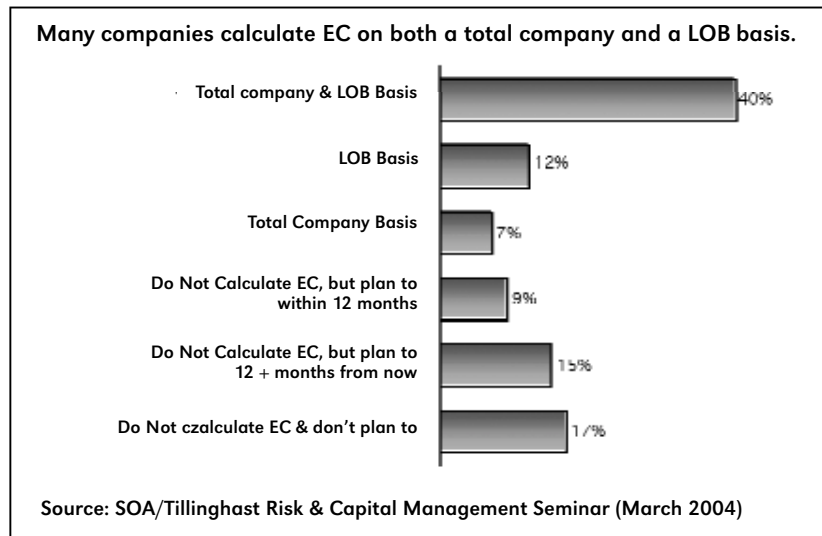
the findings from the audience poll at the earlier seminar.

Currently, economic capital is widely used in risk-based decision-making at the company, business unit and product level around the globe. Roughly three-quarters of survey respondents use economic capital in actual organizational decision-making. In particular, of those already using economic capital:

- Seventy-five percent use economic capital to allocate capital at the company level; 70 percent, at the business unit level; and 52 percent at product level.
- Seventy-four percent use economic capital at the company and business unit levels to measure risk-adjusted performance, while 50 percent use economic capital at the product level for that purpose.
- Seventy-four percent use economic capital at the company level to make strategic or tactical decisions; 53 percent do so at the business level; and 30 percent at the product level.
- Ninety percent of respondents use economic capital in product design and pricing.

Industry executives also use economic capital calculations to communicate at the company level with shareholders, rating agencies and regulatory bodies. Such communication is widespread among the Tillinghast ERM survey respondents, with the focus being on shareholders (96 percent), rating agencies (92 percent) and regulators (84 percent).

Figure 3



Regional Differences in Current Practice

While there is widespread agreement around the globe about the desirability of using economic capital in risk management programs and strong similarities in the way global insurers currently use economic capital, there are some clear regional differences in the way insurers define the liabilities in their economic capital calculations and in the measures they use to determine their level of risk tolerance.

The ultimate aim of “economic capital” is to arrive at a realistic economic measure of the amount of capital—defined as assets in excess of liabilities—which a firm needs to cover losses at a certain risk tolerance level, irrespective of regulatory rules or accounting conventions. But the use of economic capital by North American companies appears at this point to be driven primarily by regulatory requirements and the rating agency views toward capital, rather than a purely economic view of capital, i.e., responding mainly to external pressures. Executives in other regions, especially in Europe, are more likely to use economic definitions of liabilities in their calculations of economic capital, both for internal purposes and in preparation for the new insurance accounting standards (IAS) accounting requirements.

The North American “bias” toward a regulatory view is clear in the way that firms define the liabilities they include in economic capital calculations in the Tillinghast ERM survey:

- In aggregate, 41 percent of survey respondents define them as regulatory or statutory liabilities. But in North America, the number goes up to 55 percent and in Europe, it is just 28 percent.
- Ten percent of total respondents define them as GAAP liabilities, but that number is 15 percent in North America and only 7 percent in Europe.
- Forty percent of all respondents define them as economically determined liabilities in the following ways: 22 percent, as mark-to-market liabilities and 18 percent, as best estimate liabilities, while 9 percent use other definitions. But in North America, only 28 percent of the 2004 respondents use “pure” economic definitions of liabilities, while in Europe, 52 percent of companies use such economic definitions, and in Asia, 55 percent do.

Measurement of Economic Capital

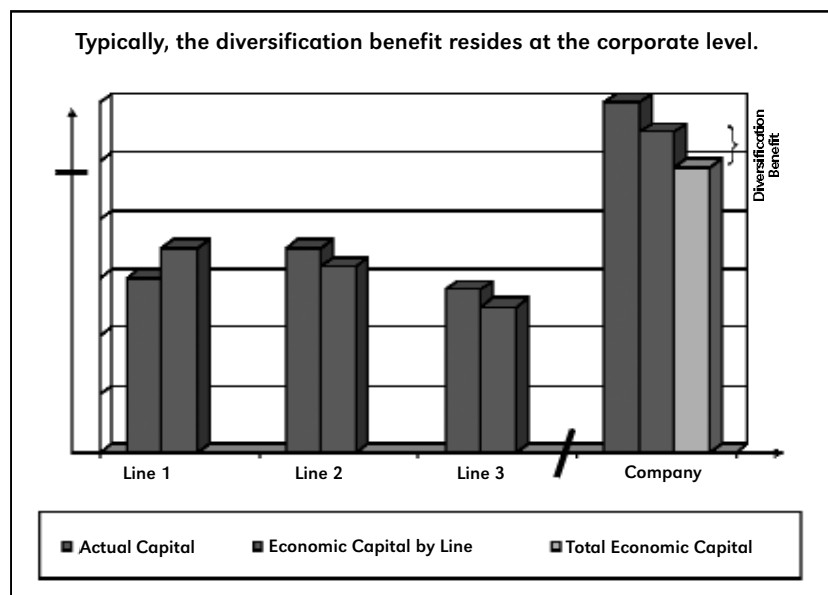
To properly measure EC, companies need state-of-the-art stochastic modeling tools. In particular,

a Conditional Tail Expectation (CTE or Tail VAR) measure is used for setting regulatory capital as part of the new C-3 Phase II proposal of the American Academy of Actuaries for variable insurance products (RBC C-3 Phase II), expected to be effective for year-end 2005. The new capital standard is based on the average required surplus for the worst 10 percent of outcomes, i.e., CTE (90) using a set of 1,000 or more stochastic scenarios, and taking into account reserves held.

When determining EC, various risk tolerance measures are currently in use in the life insurance industry. The vast majority of companies are using stochastic models to determine the right level of capital for their business. When calculating EC, insurance companies typically allow for the diversification benefit that results from combining products with different risk profiles. The resulting diversification benefit can be allocated at the line of business level (by requiring less capital), or at the corporate level. This is illustrated in Figure 4.

We believe there are a number of explanations for the variation in risk tolerance measures. First, different regions have different drivers for the use of economic capital. For example, as we

Figure 4



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saw earlier, North American companies are much more attuned to rating agency and regulatory considerations for determining economic capital. For that reason, too, they are more likely to measure risk tolerance based on TVAR or CTE, since that is what regulators in North America have come to request. The Canadian regulator (OSFI) introduced the use of a CTE measure for defining required capital on segregated fund products in 2000. In the United States, proposed regulation expected to be enacted by year-end 2005 for variable annuity risk-based capital and reserves will also be based on CTE measures.

Second, the different ways that insurers use economic capital account for some of the variation in measures. As explained earlier, currently the predominant use of economic capital is to communicate with shareholders, regulators and rating agencies. That use may explain why so many companies, especially in Europe, use “probability of ruin” as their key measure of economic risk. This is easier to explain to stakeholders than other measures, such as below target risk or economic cost of ruin. Thus, at this stage in the development of economic capital as a strategic tool for insurers, some industry executives may be making a trade-off between the technical sophistication of a

measure and its internal and external “explainability.” A clear communication of methodology and rationale for setting economic capital can do more to help increase shareholder value than a sole focus on technical sophistication.

Uses of EC

Across the world, the pioneers in implementing EC have been the multinationals and the larger insurance organizations. Companies that have implemented EC use it to determine and manage to the “right” level of capital for each line of business and to better manage their overall business. This is further illustrated in Figure 5, using the same audience poll referenced earlier.

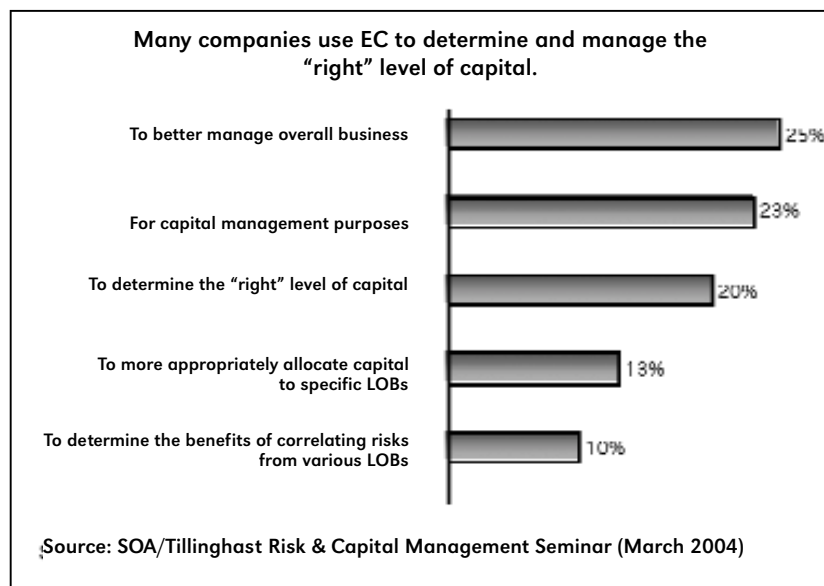
There are many other uses of EC, all of which require stochastic modeling. In particular, the proposed capital requirements for variable annuity providers in the United States are expected to lead to a significant increase in capital from current levels. Importantly, this marks the first time when regulatory capital in the United States is being defined using company-specific EC models. In Canada, this type of regulation was implemented in late 2000.

Tie-In of Economic Capital to Regulatory/Rating Agency Capital

Regulatory and rating agency capital requirements are motivated fundamentally by solvency concerns. Regulators use capital to determine a company’s financial solvency. Rating agencies are mainly concerned with the level of financial strength and general creditworthiness of an organization. These ratings provide a prospective evaluation of an insurer’s financial security to its policyholders and debt holders. Capital requirements are generally targeted using simplified methods (e.g., factor approaches) at levels appropriate for the aggregate industry and cannot reflect the nature of the company’s risks to the degree that can be achieved through a customized internal model.

The motives behind calculating economic capital concern the “appropriate” amount and allocation of capital to the risks undertaken by the company. EC answers the question, “How much capital do we need to hold, given our company’s risk profile?” The level should be sufficient for a going-

Figure 5—Uses of EC—Top 5 Answers



concern entity and reflect the degree of contribution of risk to the company. Holding too little economic capital threatens the ability of the company to meet its obligations; holding too much economic capital will unnecessarily reduce return on equity and potentially distort rational economically based decision-making.

Emerging trends for regulatory and rating agency capital are based on methods linked to internal models. These will closer align regulatory/rating agency and EC levels.

Standard & Poor's recently created a dynamic model called "Financial Product Capital" (FPC) to measure the required economic capital. The model is to replace the capital adequacy requirement historically derived using the Standard & Poor's capital adequacy. Other major rating agencies like A.M. Best and Moody's are also rolling out new capital adequacy models that give greater regard to company's proprietary models for developing EC.

The main rationales for these new models and methodologies are: (1) increased sophistication of risk management practices at many companies; (2) failure of factor-based approaches to properly deal with risks inherent in current products and investment strategies; (3) inquiries from companies seeking quantitative recognition of risk management practices, including the quality of their product structures; and (4) pressure on companies to optimize their capital base.

Rating Agencies' Views towards EC

Over the last five years, the life insurance industry in the United States has been adapting the concept of enterprise risk management (ERM) and new technologies that exist in the financial markets such as EC tools. As a result, rating agencies are responding to this new trend by adopting new criteria and tools to enhance the assessment of the risks of a corporation.

For example, Standard & Poor's applies models to determine the amount of capital and liquidity that the company is expected to hold against potential losses that could be incurred for the financial market, credit, operational risk exposure and liquidity risk relating to a specified

business activity or "book." Capital is the safety cushion that can absorb adverse loss experience across a wide range of risks.

The rating agencies use primarily static models based on statistical studies, historical experience or subjective opinions to measure the risks that are typical for a type of asset or line of business in the U.S. life insurance industry. However, this is changing, based on the increased sophistication of the insurance industry and new technology available to manage and measure risks. For example, Standard & Poor's have created the FPC model (mentioned above) to better measure the advanced Asset/Liability Management (ALM) techniques used by risk managers in the industry. The CTE approach previously mentioned is a technique that is beginning to be accepted by regulators and rating agencies as a dynamic, company-specific way to capture the tail risks of highly complex products such as variable annuity guarantees.

The main difference of the various EC definitions lies in the methodology, assumptions and quality of data used by the various parties, and the sophistication of the tools used to measure and differentiate among the various risks embedded in insurance books. As more dynamic and sophisticated methodologies are developed, and the insurance companies implement the proper risk management controls and processes, rating agencies will be in a better position to start embracing the company's internal approaches to calculate EC. For example, Standard & Poor's has given credit to both the risk-based capital model and the qualitative factors embedded in the rating to those companies that demonstrate and validate their superior risk management techniques and contractual protections that produce well below the industry average level of risks. Standard & Poor's will not be creating a proprietary economic capital model. Instead, it would use the output of the companies' economic models to the extent that it can review and validate the assumptions and methodologies used by the companies. The final risk-based capital requirement would be a combination of some aspects of the company's EC plus some adjustments and Standard & Poor's view of the risks.

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Emerging trends for regulatory and rating agency capital are based on methods linked to internal models.

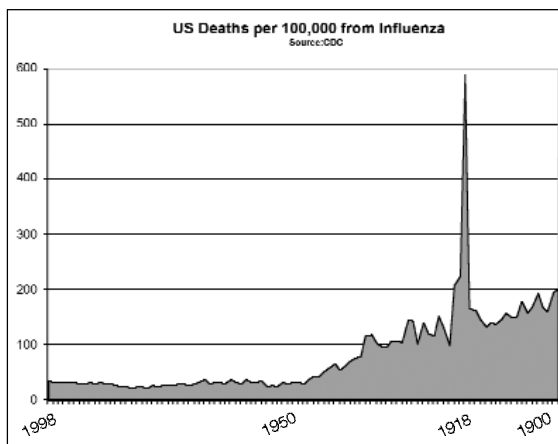
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The Next Flu Pandemic?

by David Ingram

Bird Flu has been in the news again. On Nov. 29, 2004, Dr. Shigeru Omi, regional director of the World Health Organization (WHO) for Southeast Asia, said in a public speech that at least “two to seven million people—maybe more—20 or 30 million or in the worst case 100 million” (*International Herald Tribune*, Nov. 29, 2004) could be killed in the next major flu epidemic, and that such an epidemic was “very, very likely.”



The Bird Flu, also known as H5N1, has claimed the lives of 32 of the 44 officially diagnosed cases; only a few cases of human-to-human transmission have been identified. Dr. Omi's higher estimates for flu deaths are based on extrapolations of deaths in the event that H5N1 mutates into a form that can pass from human to human without losing virulence.

After Dr. Omi's speech, the WHO confirmed that their official estimate for a worst case flu epidemic was still two to seven million, and they did not know the basis for Dr.

Omi's higher estimates or why he believed that a pandemic was so likely.

The world population is currently 6.4 billion according to the U.S. Census Bureau. The WHO estimates this would mean that a flu epidemic would add 31 to 110 additional deaths per 100,000. Dr. Omi's numbers would take that up to 312 to 469 extra deaths per 100,000 worldwide or as many as 1,563 with a death toll of 100 million.

Food for thought... If you are the CRO of a life insurance company, what is your exposure to the next flu pandemic? Should you be looking at 31 extra deaths per 100,000 or 1,500? With just a little digging, you can see that there are many ways of developing an answer to that question.

In the infamous Spanish Flu (H1N1) pandemic of 1918, deaths from flu in the United States were 588 per 100,000 for the entire U.S. population, according to the CDC report, “Leading Causes of Death 1900–1998.” Note that the upper bound on deaths mentioned by Dr. Omi of 100 million is over

250 percent of the rate experienced in the United States from the 1918 pandemic. As Max Rudolph points out in his article, “Influenza Pandemics: Are We Ready for the Next One?” in the July 2004 issue of *Risk Management* “the more we know about the last pandemic, the better we can deal with the next one.” So, does that make 588 a good number for stress testing? Probably not.

There are two major reasons that 588 may not be the right severity for an insurance or reinsurance company looking at this. First, over the past 85 years there have been many improvements in medicine and public health resulting in drastic reductions in overall mortality. In the 10 years before and after 1918, the average death rate from flu was 156. That means the flu deaths in excess of “trend” in 1918 were 432 (588 less 156). In the United States during the 1990s, flu mortality averaged less than 32, which is only 20.5 percent (32 as a percentage of 155) as high as the rate near the time of the 1918 pandemic. If you believe that the advances in medicine from 1918 to now would blunt a pandemic to the same degree that those advances have affected the base level of flu deaths, then the excess mortality would be adjusted downward to 89 (20.5 percent of 432). That adjustment includes the impact of improved sanitation, antibiotics to treat secondary bacterial infections and the use of vaccinations. At 89, we are in the range of the WHO predictions.

The second factor would be the ages of the insured population. Generally flu strikes the oldest and youngest and has much less impact on the insured ages in the middle. However, H1N1 hit people aged 20–50 particularly hard. While there are not broad age-based flu mortality rates for 1918, a look at total mortality rates for insurance ages will show that a repeat of the 1918 pandemic on a particular insured population may be more severe than the general population statistics show.

Besides medical advances and age impact, the severity of the next pandemic will be influenced by higher travel, low stockpiles of vaccines and antiviral medicines, higher population densities, much better communication and surveillance processes and the development of future new treatments. The risk manager will have to make judgement calls on the impact of each of these.



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More news on the 1918 pandemic broke on Dec. 15. (Quite amazing that an event over 80 years in the past is still making headlines.) *Nature Magazine* published an article by Harvard researchers that presented the development of the reproduction rate (R factor) for the 1918 pandemic. Their findings indicated that H1N1 had an R factor of three to four, narrowing the expected range from previous studies that put it anywhere from two to 20. This means that, in the absence of any immunity, each case of H1N1 would cause an average of three-to-four-new cases. Their study helps to provide the param-

eters that future efforts to contain the next pandemic might be operating under. They further concluded that at that R factor, the 1918 flu could possibly have been contained with modern methods including special flu vaccinations, anti-viral medicines and quarantine measures. However, they point out that stockpiles of anti-virals and vaccines are low. This R factor is approximately the same as SARS, which was quickly contained by aggressive quarantine measures. They urge “real time surveillance information must be shared freely” for appropriate counter measures to be implemented in time. ♦

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For all its power as a highly sophisticated tool in evaluating insurers’ financial strength, the risk-based capital adequacy ratio focuses only on a narrow view of capitalization when many angles are necessary. There can be no single measure that fully captures the breadth of information needed to evaluate an insurer’s level of capital adequacy. In fact, focusing on a single measure may cause an overemphasis of its importance in the overall analysis of the financial strength of an organization. All too often, both company management and analysts can focus on the management of capital to a specific ratio and ignore the larger risks inherent in the organization (for example, quality of capital, unsustainable sales growth, concentrated risks, fraud and certain operational risks). The foundation of an insurer’s capital base can differ significantly, based on its quality of capital. Based on an internal study at Standard & Poor’s, the key driver of most of its ratings is the competitive positioning of the insurer and their ability to capitalize on that position in order to translate these strengths into profitable revenue prospectively. The traditional risk-based capital adequacy ratio should only be one measure among many in measuring capital strength. It remains an important ratio, and often could be a key component of our view of an insurer’s capitalization, but it cannot be viewed in isolation. A broader perspective of what constitutes overall capital adequacy and ultimately what are the key drivers of the ratings is critical.

The ratio of public companies to private or mutual companies in the U.S. life insurance industry has increased substantially in the last decade. The resulting increase in external scrutiny has put more pressure on the industry to increase its sophistication of ERM and capital management. The pressure comes from shareholders’ increased demand of

higher returns on equity, forcing companies to deploy its excess capital through dividends or share repurchases. However, companies have to balance the short-term needs and demands from shareholders, and the long-term financial strength required to guarantee policyholders and creditor’s obligations.

In the insurance industry, there are two groups of companies: (1) those who continue to optimize capital and take their chances; and (2) those companies formulating capital planning processes with contingencies in mind. The life insurance industry has seen a litany of surprises in the last five years, such as very low interest rates, large credit defaults, unexpected large drops in the equity markets and increased competition with non-insurance products such as mutual funds, hedge funds, and capital market products. The EC models should not be designed to forecast what will happen in the future, but quantify the various outcomes, which allow management to determine its course of action. Nonetheless, models are assumption-dependent and must be cautioned with the four ‘C’s’ of risk of use:

1. Complexity can cause erroneous results;
2. subject to Compound errors;
3. difficulties in Communicating what the results mean; and
4. there are always concerns about the Consistency of assumptions and methodologies.

Outlook

Lately, EC has been widely discussed at various industry meetings in North America, including several SOA meetings, the ERM Symposium and the GARP convention. Actuaries and governing bodies in all parts of the world are showing an increasing interest in applying EC. We would expect that the methodologies for developing and implementing EC will be further improved overtime, making EC a standard tool for risk and capital management in insurance companies worldwide. ♦

On the Move ... There's a Whole Lot Going on in the Risk Management Section

by Fred Tavan

Several working groups currently lead the research activities of the Risk Management Section. The active working groups are:

1. Enterprise Risk Management (ERM)
2. Extreme Value Models
3. Policyholder Behavior in the Tail
4. Risk Metrics
5. Modeling and Managing Equity Risk
6. Economic Capital Calculation
7. Health Risk Management
8. Credit Risk
9. Integration of Risk Models

New working groups have also been recently formed by CAS members in the areas of:

1. Standard Risk and Risk Management Terms
2. Risk Tolerance
3. Operational Risk Management

SOA and CAS members are working together in some of the working groups mentioned above to help the actuarial profession move forward as quickly as possible in the risk management field.

This article provides a summary of the activities of the working groups in order to provide the reader with some insight on what information is readily available and where the Risk Management Section research is heading.

More detailed information on all of the working groups can be found at <http://rmtf.soa.org/rmtf.html>.

Enterprise Risk Management

The main goals of the ERM working group are to research ERM in life insurance companies and related financial services institutions as well as

to document common ERM practices and definitions. Jenny Bowen leads this group.

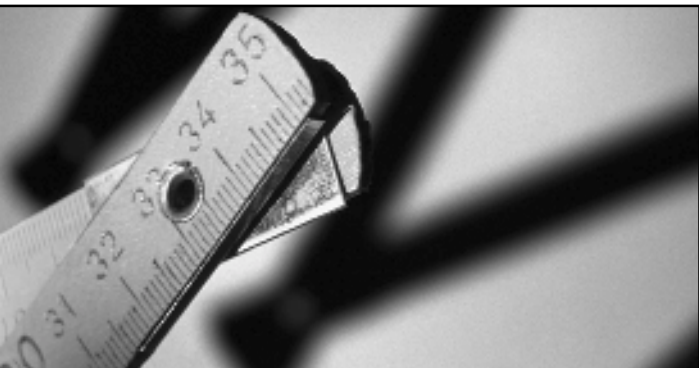
The ERM workgroup focuses on: discussions around how ERM can be used as a tool in creating shareholder value, documenting frameworks in practice today and documenting how to measure, monitor and manage exposure to uncertainty.

In addition, the ERM working group has put together a bibliography of different books that can be used by anyone interested in learning about this topic. Their work products include a list of "Ten Predictions for Risk Management" by James Lam, and "12 Best Practices for Life Insurance Company Risk Management" by Ingram, Wilkinson and Ehrlich. Other useful pieces of information that can be found are: "A Framework for Operational Risk" by Lam, The Committee of Sponsoring Organizations of the Treadway Commission (COSO) framework, the SOA Response to the COSO framework and "The Final Report of the CAS Advisory Committee on Enterprise Risk Management." All of these documents and more can be found at http://rmtf.soa.org/rmtf_erm.html.

Currently, the ERM working group is in the process of creating a Specialty Guide on ERM.

Extreme Value Models (EVM)

The main goal of the EVM working group is to increase the actuarial profession's awareness of these extreme risks and of the pitfalls of using simplistic methods to assess risks which have very low frequencies but very high costs. Research has shown that the normal distribution, which is used extensively in actuarial work, underestimates the frequency of these events. It is the working group's desire to provide education and tools to quantify, manage and price the risks



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associated with extreme-valued outcomes. This working group is led by Tom Edwalds.

Three of the most important ideas underlying EVM are:

1. The tails of many distributions can be approximated by the Generalized Pareto distribution.
2. For a wide array of distributions, as the number of observations in a random sample from that distribution increases, the distribution of the maximum of those observations resembles the Generalized Extreme Value (GEV) distribution. Just as the Central Limit Theorem shows that Gaussian distributions are key to the analysis of means of random samples, this result shows that GEV distributions are essential to an understanding of the maximum of such samples.
3. Situations involving multiple random variables cannot be analyzed with only knowledge of those variables' marginal distribution. Especially in the prediction of the variables', joint dependence is crucial. "Copulas" are functions which can be used to study and specify this dependence.

A bibliography of published materials on the topic of EVM as well as book reviews is provided at http://rmtf.soa.org/rmtf_ evm.html.

Actuaries should be motivated to look at Extreme Value Models by considering the following list of historic events that should never have happened:

1. Sinking of the Titanic
2. Wall Street Crashes of '29 and '87
3. 9/11
4. Bhopal
5. Chernobyl
6. Flu epidemic of 1919-1921
7. Soviet Union break-up
8. OPEC oil-crisis
9. Oklahoma City bombing
10. Savings and Loans financial crisis
11. The Ice Ages
12. Extinction of dinosaurs
13. Axis of revolution of earth shifting dramatically (Sahara desert used to be one of the poles)
14. Duke University hospital transplanting organs of the wrong blood type
15. Surviving septuplets

Now consider the following list of things that have never happened and think about whether they should be included in some of the analyses that actuaries conduct:

1. A new worldwide untreatable disease epidemic
2. Political and economic isolation of United States
3. Expanded use of euthanasia to control aging population
4. Substantial rise in sea level
5. Large meteor impact
6. Major disruption of the supply of crude oil
7. Collapse of world banking system
8. Stock Market fails (completely)
9. United States ceases to be a democracy (like Rome in 40 B.C.)
10. Major release of radioactive, chemical or biological agents (WMD)

Steve Craighead has developed an Excel workbook that can be used to become familiar with calculations stemming from Extreme Value Theory. Links to how to use the worksheet and applications of these techniques can be found at http://rmtf.soa.org/rmtf_ evm.html.

Policyholder Behavior in the Tail

Bob Lalonde and Steve Siegel have been working on a list of ultimate research deliverables for Dr. Changki Kim.

Dr. Kim will initially use Korean data to do research on policyholder behavior in the tail. The Korean data will be used to illustrate the application of his approach to determine the range of possible results for policyholder lapse behavior in the tail from a few products. Efforts are also underway to obtain U.S. data to be used by Dr. Kim in his research. Discussions have started about the possibility of obtaining Venezuelan and Japanese policyholder data reflecting their recent crisis situations.

Risk Metrics

The main goal of this working group, led by Fred Tavan, is to research risk management metrics and tools that can help in making key business decisions.

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It is the working group's desire to provide education and tools to quantify, manage and price the risks associated with extreme-valued outcomes. This working group is led by Tom Edwalds.

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On the Move ...

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This group has developed a number of documents in pursuit of its goal to document risk metric definitions and applications within the industry. These documents can be found at http://rmtf.soa.org/rmtf_rmm.html.

The group has been developing a database of alternative risk metrics which can be used for various risk categories and subcategories within the AAA risk management framework. Alternative risk metrics have been identified for market and credit risks, and the group is now tackling the challenge of finding metrics for operational risk subcategories.

The need to find metrics for operational risk has led to further research into Fuzzy Logic which is an approach well suited in applications where there is little data. Fuzzy Logic provides a structural framework for converting expert judgment into quantitative models that can then be used to analyze risk. The risk metrics working group has started to build a Fuzzy Logic model for competitive risk and will learn about its potential applications through this experience.

Modeling and Managing Equity Risk

This working group was led by Josephine Marks and has completed its goal of creating a recommended reading list for those who would like to investigate this topic in greater detail. The reading list can be found at http://rmtf.soa.org/rmtf_em.html.

The most popular equity models can be classified as either equilibrium or no-arbitrage models. Equilibrium pricing models make assumptions about the environment driving equity prices. No-arbitrage pricing models value financial instruments with reference to other assets whose market prices are known in order to keep consistency with current market prices.

Equity models generally use the assumption that equity prices follow a stochastic process. Models are often constrained by a further Markovian

assumption so that future stock prices depend only on today's market and the history of the process has no impact on future equity returns. Markovian models are consistent with the weak form of the efficient market hypothesis. A Wiener process, also called Brownian motion, is a special type of Markov process. Brownian motion of the underlying asset is one of the key assumptions of the Black-Scholes equation.

It is up to the individual practitioner to further investigate and decide on the appropriate model type depending on the application at hand. Equilibrium and no-arbitrage pricing models each have advantages. A review of the list of reading and corresponding book reviews prepared by this working group will help actuarial practitioners who face equity modeling challenges.

Economic Capital Calculation

The main goals of this working group include: researching comprehensive measurement of economic risk in life and health insurance companies, documenting techniques and standards to quantify the material risks, and documenting techniques for allocating economic capital for use in pricing, budgeting and financial reporting. This working group was initially led by Hubert Mueller, followed by Jenny Bowen, and has completed its goals, so it is no longer active.

The working group carried out a survey on industry practices around Economic Capital (EC). The results of this survey can be found at http://rmtf.soa.org/rmtf_ecca.html.

The discipline of economic capital (EC) allocation is still too immature to find meaningful, dependable "best practices" to analyze and share in an effort to help actuaries bridge the gap between theory and practice.

A standard definition of EC is not readily available, as shown by the wide variety of responses in the survey. Common themes found in the various definitions include:

1. Sufficient surplus to cover adverse outcomes
2. A given level of risk tolerance
3. A specified time horizon

At its most basic level, EC can be defined as sufficient surplus to cover potential losses, at a given risk tolerance level, over a specified time horizon. It is important to understand the distinction between EC and regulatory capital. Regulatory capital formulas are based on industry averages that may or may not be suitable to any particular company while EC calculations are specific to the company's risks.

Companies that favor using EC cite several reasons, including:

1. EC reflects the underlying economics of the company as opposed to regulatory and rating agency conservatism.
2. Regulatory capital may not allow for all types of risks.
3. Companies working in several jurisdictions are subject to various regulatory capital rules while they need a single EC system to take advantage of economies of scale.
4. EC calculations allow companies to figure out whether there are any regulatory arbitrage opportunities.
5. EC can be more directly compared across lines of business, e.g., banking versus insurance products.

More details about EC can be found in the "Specialty Guide on Economic Capital" prepared by members of the EC working group. The specialty guide can be found at: http://mtf.soa.org/rmtf_ecca.html. The specialty guide includes sections on uses of economic capital, current approaches to calculating EC and current approaches to allocating EC, as well as a review of the literature available on this topic.

Health Risk Management

The main goal of this working group, led by John Stark, is to research risk management in health insurance companies and to document risk definitions as well as risk management techniques appropriate for health insurance.

Research needs to be completed in the area of risk management for health insurance companies, which includes HMOs, PPOs, indemnity carriers, reinsurers, etc. The issues are identical to those for life companies plus others peculiar to the health business such as provider network development and maintenance. The areas of common ground differ in degree, e.g., investment risk is much more critical to life insurers than to most health insurers, while state mandates have a larger effect on health carriers.

Credit Risks

The main goal of this working group is to identify ways that actuaries can learn about credit risk, credit risk modeling, credit risk management and the uses and risks of credit derivatives. This is a relatively new group and is led by David Ingram.

A wealth of credit risk and credit risk modeling information can be found at www.defaultrisk.com.

Integration of Risk Models

This is a new working group led by Dr. Ken Seng Tan of the University of Waterloo. As the name of the group indicates, this group will do research around how various risk models can be integrated together to give an aggregate view of overall risk for a company. Most companies currently use various approaches and models to measure market risk, credit risk and operational risks with different risk metrics for each. ♦

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At its most basic level, EC can be defined as sufficient surplus to cover potential losses, at a given risk tolerance level, over a specified time horizon.

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CAS ERM Introductory Treatise and Related Initiatives

by John J. Kollar

Against the Gods: *The Remarkable Story of Risk* provides an entertaining and informative history of risk and humanity's progress in dealing with it. From blaming the gods or magic for our misfortune, our understanding of risk has evolved to measuring and managing it. Enterprise Risk Management (ERM) is part of the evolution of risk management, albeit challenging and sometimes frustrating in its broadest vision.

With their skill sets, actuaries can play an important role in meeting the challenges and overcoming the frustrations of ERM. This article addresses recent CAS ERM efforts, including several joint initiatives with the SOA.

In its November 2001 report to the CAS Executive Council and the Board, the ERM Advisory Committee spelled out specific research and education priorities over the next

several years to prepare the CAS membership to be active players in the emerging ERM movement. Existing CAS Admissions and Professional Education Committees took up the education priorities, including those detailed in a set of ERM Learning Objectives, developed by the advisory committee. The research priorities were assigned to a new research committee; thus, the ERM Committee (ERMC) was formed in February 2002. The ERMC's work to date includes the compilation, organization and annotation of a comprehensive ERM bibliography and the creation and population of a new Web site for ERM (<http://www.casact.org/research/erm/>).

One of the big public ERM successes has been the jointly sponsored CAS/SOA ERM Symposium, which was initiated in 2003. The

2004 Symposium was even more successful attracting international representatives from financial services and other industries as well as SOA and CAS members.

But the area where actuaries are likely to make the greatest contribution is research. Perhaps the most significant early undertaking of the ERMC is its research into, and drafting of, an original introductory treatise on ERM specifically for property/casualty actuaries and students. This work is now complete. The article, "Overview of Enterprise Risk Management," (<http://www.casact.org/research/erm/overview.pdf>) is available on the CAS Web site and is published in the Summer 2003 *Forum* (<http://www.casact.org/pubs/forum/03sforum>). This document is intended primarily to further the risk management education of candidates for membership in the CAS, but current CAS and SOA members and other risk management professionals should also find this material of interest. The document (34 pages of text, and another 28 of appendix material, both liberally illustrated) begins with an explanation of the evolution to and rationale for ERM. The ERM movement is known to be driven by both internal (e.g., competitive advantage) and external (e.g., corporate governance) pressures.

The document then defines ERM for CAS purposes and lays out its conceptual framework. The definition makes clear that ERM is a value-creating discipline. The framework describes both the categories of risk and the types of risk management processes covered by ERM. Enterprise risk management extends well beyond the hazard risks with which casualty actuaries are particularly familiar, and well beyond the quantification of risks with which they are particularly skilled. But it is clear that the actuarial skill set is extremely well suited to the practice of ERM.



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The “vocabulary” of ERM is established in the lengthiest chapter of the document, which also describes the measures, models and tools supporting the discipline. The close linkage between ERM and corporate performance management is made clear in this discussion. Dynamic financial analysis (DFA) is introduced, along with alternative approaches to capture hazard and financial risks, and their roles within an ERM context are explained. Models that treat operational and strategic risks are also discussed. Applications of these measures, models and tools to support management decision-making conclude the chapter.

With the conceptual and technical foundations of ERM thus established, the last two chapters turn to the actual practice of ERM. One chapter presents relevant case studies from various industries; the other offers some practical considerations in implementing ERM.

For the reader interested in pursuing additional sources of learning on the subject, a short-form version of the ERM bibliography is included as one of the appendices. (A continually updated, annotated and topically organized road map through the literature can be found on the CAS ERM Web site at <http://www.casact.org/research/erm/>).

Enterprise risk management is a “big idea.” Among other things, ERM can be viewed as the broad conceptual framework unifying the many varied parts of the actuarial discipline. ERM provides a logical structure to link these subject areas together in a compelling way to form an integrated whole. In so doing, ERM addresses critical business issues such as growth, return, consistency and value creation. It expresses risk not just as threat, but also as opportunity—the fundamental reason that business is conducted in a free enterprise system. Through ERM, the clear linkage between business fundamentals and actuarial theory and practice should engage students and professionals from various backgrounds in the study of actuarial science—a logical

career strategy in a global business environment that has embraced ERM as a modern management discipline.

In March of this year, the CAS Board of Directors adopted the following as the Society’s goal for its 2014 Centennial: “The CAS will be globally recognized as the pre-eminent resource in educating casualty actuaries and conducting research in casualty actuarial science. CAS members will be recognized as the leading experts in the evaluation of hazard risk and *the integration of hazard risk with strategic, financial and operational risk.*”

One component of this statement is a call to action for CAS members who are not yet up to speed on enterprise risk management to get there quickly. Fortunately, they now have considerable help. The SOA has recognized the importance of (enterprise) risk management by establishing the Risk Management Section to foster the involvement of SOA members in the risk management process. The Risk Management Section Council has invited CAS members to join the section. The SOA and CAS are now investigating joint sponsorship of the Risk Management Section. In the meantime, a variety of joint research committees are exploring a variety of important issues including correlations, risk tolerances, risk metrics, operational risk and risk preferences. And planning continues for an even bigger and more successful ERM Symposium in 2005. ♦

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Risk and the Actuarial Profession: Two Visions Emerge

by Charles L. Gilbert

This article focuses on international developments and outlines proposed initiatives the actuarial profession plans to undertake following the IAA meetings in November.

If we are to thrive as a profession, there is a necessity for the actuarial community at large to globalize and broaden our sights beyond traditional areas of practice. An important first step toward this goal is to establish the actuarial profession globally as experts in the broader risk field.

Actuarial science can be described as the study of the pricing, valuation, analysis and management of risk. For more than 150 years, the focus of the actuarial profession has been the application of risk expertise to insurance and pensions. This highly specialized and complex area of focus has required more rigorous study and training than any other profession. (Indeed, the travel time needed for a Ph.D. in rocket science is less than half!) It has been suggested that this specialization in insurance and pensions has led to missed opportunity. The actuarial profession produces highly trained and specialized risk professionals who have tended to apply their risk expertise to a very narrow field. Few actuaries have ventured outside traditional boundaries or applied actuarial approaches to other areas such as banking and investments. Fewer still have ventured beyond the financial institutions sector.

All of this may be about to change.

In the past few years, companies have started realizing the importance of Enterprise Risk Management (ERM). Insurance companies in particular have been at the forefront of implementing ERM frameworks. Increasingly, rating agencies, analysts and regulators are starting to look for evidence of ERM when they analyze companies and industries. ERM best practices are still evolving and so far no single profession

has been able to claim the ownership of this new discipline. There is a unique window of opportunity for the actuarial profession to champion this new discipline and define the risk profession.

However, this window is closing fast. Other professions and various organizations including PRMIA, GARP and the CFA Institute have been successful in identifying market opportunities and moving to position themselves appropriately. The Internal Auditors and CPAs are trying to claim ERM and are moving into this space with their COSO ERM Framework. The current value proposition of these organizations is quite narrow, seeking to provide either 1.) a risk monitoring device (e.g., COSO ERM Framework, influenced by the Sarbanes-Oxley Act) or 2.) fragmented risk analysis (e.g., silos of market, credit and operational risk in banking by GARP, driven by the Basel Accord). These groups deal easily with objective, known quantities and verification, but are less effective addressing ambiguity, correlations, aggregation and disaggregation of risks, long-term uncertainties and the concept of risk as opportunity for strategic decision-making and leadership at the enterprise level.

To be sure, ERM is a significant subset of the broader risk management field. A further distinction can be made between risk management and risk practice: Financial institutions (and insurance companies in particular) are in the business of taking risks for which they are fairly compensated. Risk practice includes the pricing, valuation, analysis and management of these risks. Risk practice therefore encompasses both risk management and risk-taking activities.

Despite a traditional focus on insurance and pensions, the actuarial profession is currently the closest that exists to a bona fide risk profession. This is not expected to last for long as other organizations will likely continue to move forward toward establishing themselves



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as bona fide professions complete with more rigorous education and continuing professional development requirements, standards of practice, rules of professional conduct and discipline for their members.

Actuarial organizations around the world have been recognizing the need for actuaries to expand the application of their risk expertise beyond the traditional actuarial boundaries. The International Institute of Actuaries has created a Task Force on Risk Practice to globalize the actuarial profession in the area of risk and to establish the best way forward.

While the importance of risk practice is universally acknowledged, the exact role the actuarial profession should take is the topic of much debate. The IAA Task Force has received input from various actuarial organizations and a number of proposals have been put forth on how we should move forward. These proposals have included discussions regarding the creation of a new Chief Risk Analyst designation, accreditation of universities, governance, and coordination within the actuarial profession, cooperation with other organizations and professions as well as other initiatives.

Over the course of these discussions two distinct visions have emerged.

1.) Expand Risk Practice Within the Actuarial Profession

The first vision is to further develop and promote the broader application of risk expertise of the actuarial profession and improve coordination internationally. One possible way this might be achieved is through the creation of a **Risk Board of the Actuarial Profession**. To this end a number of specific initiatives are being proposed aimed at promoting the risk management expertise of the actuarial profession globally.

2.) Create a New Risk Profession

Another vision is to form a new profession – the **International Risk Institute** – jointly with other risk organizations to become the leading professional organization for ERM research, education and practice, and possibly

eventually granting a Chartered Risk Analyst designation. This would also be likely to involve strong strategic alliances with a number of risk organizations.

The prima facie reaction of both the Canadian and United Kingdom actuarial professions is that they do not readily support the creation of a separate risk profession. The CIA provided the following statement to the IAA Task Force:

“The CIA view is that actuaries are risk management professionals. It is important for us to ensure that the capabilities that make us a strong profession in this regard continue to be relevant to the changing environment. We must adapt our educational and qualification processes as necessary to ensure that we continue to produce true professionals to work in the financial risk management arena.”

While there are mixed views regarding the creation of a new, separate profession, there is general support for expanding the actuarial profession to encompass risk practice which will strengthen both the reputation and credibility of the profession in its traditional areas of insurance and pension practice.

The IAA Task Force on Risk Practice will present its report at the IAA meetings in Washington in November. There is indeed a window of opportunity for the actuarial profession to establish itself as a leading risk profession unconstrained by traditional actuarial boundaries. However, decisive action must be taken now before this window of opportunity slams shut.

Entering the Broader Risk Field

As mentioned at the beginning of this article, actuarial science can be described as the study of the pricing, valuation, analysis and management of risk. The Canadian Institute of Actuaries and the Society of Actuaries state



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Risk and the Actuarial Profession ...

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the common vision *'for actuaries to be recognized as the leading professionals in the modeling and management of financial risk and contingent events.'*

No doubt about it; actuaries are in the business of risk. Some would argue that the actuarial profession is the world's oldest – and currently the only – bona fide risk profession. That is not

meant to be a knock against other esteemed organizations, professionals or individuals working in the risk field. It is just an observation that the actuarial profession is the only risk profession with rigorous education and examination requirements, standards of practice, rules of professional conduct, continuing professional

development requirements and discipline for its members. In many jurisdictions, actuaries are formally recognized in law.

Traditionally, actuaries have tended to specialize in either the insurance or pension fields. In recent years, however, actuaries have started broadening their skills and applying their risk expertise to areas outside the traditional actuarial boundaries. Actuaries are now working in banks, assuming roles as chief risk officers and playing a leading role in the evolution of enterprise risk management. This demonstration of the risk expertise and judgment of actuaries outside the insurance and pension fields is vital for the profession. All actuaries benefit from the application of actuarial approaches to new areas and the contributions actuaries make in the broader risk field.

Internationally, the actuarial profession has been examining its broader role in the risk practice area. In June, an IAA Task Force on Risk Practice was established to examine what course the profession should be taking. At the same

time, other groups and individuals have also been exploring other courses of action.

Two events took place in November that could have a profound effect for the actuarial profession:

- BOSTON, Nov. 10, 2004 – A group of individuals from various organizations including the Society of Actuaries (SOA), the Casualty Actuarial Society (CAS), the Professional Risk Managers International Association (PRMIA) and two universities form the ERM Institute.
- WASHINGTON, the next day – The International Association of Actuaries (IAA) Financial Risk Committee support the recommendation of the IAA Task Force on Risk Practice to create a Risk Section of the IAA and move forward with several specific risk initiatives.

Both of these initiatives seek to extend the risk expertise of actuaries beyond the insurance and pension worlds. Let us take a closer look at each of these.

IAA Risk Section—Expanding Risk Practice Within the Actuarial Profession

The creation of a risk section within the IAA will be a major step toward globalizing the profession in the risk practice area. What is currently being envisioned is to expand, refocus and rename the existing AFIR Section (what was described previously as the Risk Board of the Actuarial Profession). The two primary objectives are:

1. Globalize the actuarial profession in the risk practice area
2. Promote and demonstrate the risk expertise of actuaries

The first objective of **globalizing the profession in the risk practice area** will be achieved by coordinating activities through the soon to be created risk section of the IAA. Some of the proposed initiatives include:

- Establishing formal liaisons with various actuarial sections, committees and working groups related to risk practice worldwide
- Coordinating and jointly sponsoring risk practice related activities



- Creating international working groups to execute global risk practice priorities
- Publishing and promulgating standards and best practices
- Engaging with rating agencies and regulators
- Creating the IAA as a brand

The second objective of promoting and demonstrating risk expertise of actuaries will be achieved through several specific initiatives including:

- Sponsoring risk-related symposia, specialty seminars and meetings
- Raising the profile of these events
- Organizing a global risk event to be held annually
- Conducting a global survey of risk practices
- Develop survey based on input from regulators, rating agencies, bank and insurance executives, media
- Promote survey while it is being conducted
- Promote risk practice research in the mainstream press
- Expand and improve IAA Web site

ERM Institute—Creating a New Risk Profession

Building off the success of the jointly sponsored ERM Symposia, the creation of the ERM Institute will involve strategic alliances with various organizations and universities and aim to become the leading professional organization for ERM research, education and practice. The ERM Institute may also seek to create its own designation (i.e., Chartered Risk Analyst), conduct its own exams and set up its own governance, standards of practice, rules of professional conduct and discipline for its members – effectively becoming a separate profession. While there is general agreement that there are many positive mutual benefits to be gained by working with other organizations and professions, there are concerns that the creation of a new, separate risk profession would compete with the actuarial profession for jobs and new entrants. One response to those concerns is that this will happen in any event and that it is better for the actuarial profession to be part of it.

While there is some disagreement over the best course of action to pursue, all agree that the window of opportunity to act is about to close very

soon. Two courses have been charted and it is time now to move full steam ahead. ♦

Author's Note: This article was written immediately following the International Actuarial Association meetings in Washington last November. At that time the ERM Institute had not established its mission and purpose and was still evolving. Shaung Wang, also a member of the International Actuarial Association Task Force on Risk Practice, has been instrumental in the creation of the ERM Institute and will provide an update on recent developments in an upcoming issue of the Risk Management Newsletter. There has been significant debate over whether the creation of a new risk profession would in fact be harmful to the actuarial profession. The views expressed in this article those of the author.

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The creation of a risk section within the IAA will be a major step towards globalizing the profession in the risk practice area.

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ERMII: Another Perspective

by W. James MacGinnite

Charles Gilbert urges a greater role for actuaries and our capabilities in the emerging area of risk management, and particularly Enterprise Risk Management (ERM). I believe that all actuaries should support that objective. While he suggests that two distinct visions have emerged, my own view is that a large number of visions, and the accompanying strategies and tactics, are emerging. And in Darwinian fashion, some of them will survive and prosper, others will not, new ones will emerge, and most will adapt as the environment unfolds.

many more practitioners of risk management in fields other than insurance and retirement systems, particularly in investments and banking, but increasingly in energy, supply chain management, transportation, etc. These practitioners have already begun to form associations, and some of these associations are beginning to morph into professional organizations, with entrance examinations, codes of conduct, standards and, eventually, discipline. It is here that we will see Darwinism in action. Whether these practitioners will end up organized by industry, by country, by type of risk, as membership organizations or as professions, all remain to be seen. But the numbers will be an order of magnitude or two larger than the membership of traditional actuarial organizations. All industries, not just insurers or financial institutions, have an interest in risk management. It is highly unlikely that the current process for training new actuaries, with its 5-10 year travel time after university, will prosper in this environment. Nor will the membership of the traditional actuarial organizations countenance a perceived reduction in standards that will significantly shorten that travel time. So we are saddled with an initial accreditation system that will tout a few hundred new actuaries per year, while the larger risk management discipline needs many thousands.

The ERM Institute International (ERMII), headed by Shaun Wang of Georgia State University, has evolved since the time Mr. Gilbert wrote his article. The ERMII is currently an initiative by a consortium of universities worldwide. It will jointly develop a common set of syllabus and educational materials in risk management to be used by member universities worldwide. It will also sponsor multidisciplinary research in broader risk management, with particular emphasis on combining the talents of academics and practitioners in insurance, banking, energy and other sectors. I believe that this initiative deserves the support of actuaries and their associations, because it would advance our role in wider fields than our traditional insurance and retirement systems. Because of these positives for our profession, I am helping Dr. Wang develop this initiative.

Mr. Gilbert opposes the creation of a new profession; I hold a different view. Today there are

Actuaries also hold a losing hand in funding. Banks have driven the Basel accords, which in turn are driving much of the activity in the larger risk management field. Particularly noteworthy is the provision that bank supervisory authorities can defer to internal risk management models and programs, rather than rely on the "one-size-fits-all" rules that are so common in insurance and retirement systems. And Basel has been funded by central banks, which are among the primary regulators, and which usually generate large "profits" that can be used to fund the research and other activities that underpin Basel. Insurance and retirement



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systems have no comparable source of funding, and hence rely on staffing and research primarily by volunteers. Coupled with the observation that more banks own or control insurance companies than vice versa, it should be no surprise that banks, their risk managers and their approach to risk management have been coming out on top. Compare the number of senior executives of insurers who came from banking to the number that went the other way.

If actuaries are to have a significant role in this emerging world, we must adapt and we must find a way to partner with the risk managers in the banking and other worlds. In my opinion, that means working with them to create a new profession, one that is defined broadly over banking, insurance, retirement systems, energy, etc. We can bring to the table our long

experience with the professionalism aspects: code of conduct, standards and discipline. They can bring their numbers and their funding. Both can contribute intellectual capital and learn from each other.

The alternative is that we will be confined to our traditional areas, which will be increasingly invaded by the new risk managers. The Geneva Association recently hosted a seminar for chief risk officers of major global insurance companies. Less than half of the attendees were trained as actuaries. The risk managers are going to create a new profession; they're already well on the way. It really doesn't matter to them whether the actuarial profession participates; but it matters hugely to the actuarial profession. ♦

Exciting and Challenging Times for Risk Managers

▶ continued from page 3

Operational Risk Framework and Measurement. Formalized processes for the identification and management of operational risk within insurance entities have slowly been evolving, motivated by recent operational risk events. The challenges here are more structural in nature and relate to some of the other challenges such as developing a risk governance framework with more formalized processes and creating a risk culture. The measurement of operational risk is one area that requires continued research and study. This is especially true if operational risk measures are to be combined with other financial measures of risk.

Risk Governance and Culture. Creating the appropriate risk management governance structure that supports the development of a corporate culture with respect to risk is another

challenge that requires attention. This may be the most difficult task of all. Frequently, the creation of an appropriate culture is at odds with embedded practice and attitude.

I'm sure there are other challenges and certainly those that are unique to each organization. Our training and experience make us eminently qualified to address these challenges. However, risk management is not the unique domain of actuaries. There are others from within and outside the insurance industry who have presented meaningful credentials. We need to work to expand our skill sets to encompass all aspects of enterprise risk management and provide leadership in addressing the implementation challenges and establish our profession as the premier risk management organization. ♦

2005 Enterprise Risk Management Symposium Announcement

Building on the tremendous success of the last two years, the Society of Actuaries, Casualty Actuarial Society, Georgia State University and the Professional Risk Managers' International Association are partnering again to announce the 2005 Enterprise Risk Management (ERM) Symposium. This world-class professional education global event will focus on risk management issues applicable to the entire spectrum of the risk profession, which should appeal to any professional practicing or seeking to practice in this emerging discipline, and provides an exceptional opportunity for financial services industry and corporate risk professionals to broaden their skills.

In spite of its tender age, this symposium immediately received great attention from the risk management community after its launch in 2003. It has consistently brought together some of the best and the brightest minds in ERM, who, over the course of event, have been able to successfully network and deliberate on a variety of critical issues in enterprise-wide risk management. By providing extensive opportunities for interaction with faculty and peers, this symposium is ideal for learning more about current and emerging risk management trends and practices, as well as keeping up to speed with the latest ERM developments.

The following are expected general themes for the 2005 ERM sessions. The intent is to address various areas of practice and various industries – from financial services to energy and corporate, and beyond, allowing for cross-pollination of the best risk management practices across various economic sectors, using experience gained around the globe. Both practical and conceptual presentations will be provided including general sessions and concurrent breakout sessions. Some of the key topics to be addressed will include:

- Correlation and Integration of Risks Across an Organization
- Creation of Value through ERM
- ERM Risk Reporting Formats
- Theoretical Foundation and Practical Applications of ERM
- Recent Trends with ERM
- Translating Risk Monitoring and Measurement into Decision-Making
- Implementing an ERM Framework
- Economic Capital Management and Implementation
- Operational Risk Measurement and Management
- Role of the Chief Risk Officer

Our speakers include chief risk officers and other top risk management experts from around the world, offering their perspectives on key risks facing many organizations and best practices for ERM.

Please mark your calendars!

The 2005 ERM Symposium is scheduled for May 2-3 and will be held at the Sheraton Chicago Hotel & Towers.

A separate limited-attendance ERM Essentials Workshop will be held on May 1, targeted at senior management interested in establishing effective ERM frameworks within their companies. The workshop will take a step-by-step look into the art and science behind ERM and provide the opportunity for personalized interaction with a number of ERM expert panelists.

A separate Web site has been created for the ERM Symposium at <http://www.ermsymposium.org>. This Web site contains further information on the session program, registration and hotel reservations.

We look forward to seeing many of you at the symposium. ♦

Articles Needed for *Risk Management*

Your help and participation is needed and welcomed. All articles will include a byline to give you full credit for your effort. If you would like to submit an article, please contact Ken Seng Tan, editor, kstan@uwaterloo.ca.

The next issue of *Risk Management* will be published:

Publication Date	Submission Deadline
July 2005	May 2, 2005

Preferred Format

In order to efficiently handle articles, please use the following format when submitting articles:

Please e-mail your articles as attachments in either MS Word (.doc) or Simple Text (.txt) files. We are able to convert most PC-compatible software packages. Headlines are typed upper and lower case. Please use a 10-point Times New Roman font for the body text. Carriage returns are put in only at the end of paragraphs. The right-hand margin is not justified.

If you must submit articles in another manner, please call Joe Adduci, (847) 706-3548, at the Society of Actuaries for help.

Please send an electronic copy of the article to:

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Thank you for your help.

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2004-2005 SECTION LEADERSHIP

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