

Risk management



ISSUE 21 ■ MARCH 2011

CHAIRPERSON'S CORNER

- 3 **Letter from the Editor**
By Ross Bowen

EDITOR'S NOTE

- 4 **Diverse Perspectives on Risk Management**
By A. David Cummings

GENERAL

- 5 **The Fabric of ERM**
By Alice Underwood and David Ingram

RISK IDENTIFICATION

- 8 **The New International Standard on the Practice of Risk Management – A Comparison of ISO 31000:2009 and the COSO ERM Framework**
By Dorothy Gjerdrum and Mary Peter

RISK QUANTIFICATION

- 14 **Measuring the Market Value of Risk Management**
By Don Mango and John A. Major

RISK RESPONSE

- 18 **Perspectives on Variable Annuity Guarantees**
By Jason Alleyne, Ben Neff and Min Yang

RISK CULTURE AND DISCLOSURES

- 26 **How Can We Keep it From Happening Again: The ERM-II Systemic Risk Workshop**
By Louise Francis
- 29 **2010 Marks Fifth Year for ERM Symposium Scientific Papers Track**
By Steven C. Siegel

Risk management

Issue Number 21 • MARCH 2011

Published by the
Society of Actuaries

This newsletter is free to section members.

2011 SECTION LEADERSHIP

Newsletter Editor

Ross Bowen
e: Ross.Bowen@allianzlife.com

Assistant Editors

Steven Craighead
e: steven.craighead@towerswatson.com

Mohammed Ashab
e: mohammed.ashab@signal-ctc.com

Saskia Goedhart
e: SGoedhart@munichre.ca

Ashley Goorachurn
e: ashley.goorachurn@sunlife.com

Officers

A. David Cummings, FCAS, MAAA, Chairperson
Stuart F. Wason, FSA, CERA, FCIA, MAAA,
HONFIA, Vice Chairperson
Jason Alleyne, FSA, FCIA, FIA, Treasurer

Council Members

Christopher (Kip) Bohn, FCAS, ASA, CERA, MAAA
Ross Bowen, FSA, MAAA
Stephen P. Lowe, FCAS, ASA, CERA, MAAA
B. John Manistre, FSA, CERA, FCIA, MAAA
Glenn Meyers, FCAS, ASA, CERA, MAAA
Mark J. Scanlon, FSA, CERA, FIA, MAAA
Michael P. Stramaglia, FSA, FCIA
Frank Zhang, FSA, MAAA

SOA Staff

Kathryn Baker, Staff Editor
e: kbaker@soa.org

Robert Wolf, Staff Partner
e: rwolf@soa.org

Sue Martz, Project Support Specialist
e: smartz@soa.org

Julissa Sweeney, Graphic Designer
e: jsweeney@soa.org

Facts and opinions contained herein are the sole responsibility of the persons expressing them and should not be attributed to the Society of Actuaries, its committees, the Risk Management Section or the employers of the authors. We will promptly correct errors brought to our attention.

© Copyright 2011 Society of Actuaries.
All rights reserved. Printed in the United States of America.

JOINT RISK MANAGEMENT SECTION

Canadian Institute of Actuaries
Casualty Actuarial Society
Society of Actuaries

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 Ross Bowen, editor, at Ross.Bowen@allianzlife.com.

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

PUBLICATION DATES

August 2011
December 2011

SUBMISSION DEADLINES

April 25, 2011
September 3, 2011

PREFERRED FORMAT

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

- Word document
- Article length 500-2,000 words
- Author photo (quality must be 300 DPI)
- Name, title, company, city, state and email
- One pull quote (sentence/fragment) for every 500 words
- Times New Roman, 10-point
- Original PowerPoint or Excel files for complex exhibits

If you must submit articles in another manner, please call Kathryn Baker, 847.706.3501, at the Society of Actuaries for help.

Please send an electronic copy of the article to:

Ross Bowen, FSA, MAAA

Allianz Life Insurance Co of North America
ph: 763.765.7186
e: Ross.Bowen@allianzlife.com

Letter from the Editor

By Ross Bowen

WELCOME TO THIS ISSUE OF THE RISK MANAGEMENT NEWSLETTER!

David Ingram and Alice Underwood co-wrote “The Fabric of ERM,” which distinguishes between different approaches to ERM. They go on to give examples of each approach and consider the different strengths and weaknesses. I found that this article is a good reminder that ERM is frequently used in a wider context than insurance or banking.

In Dorothy Gjerdrum and Mary Peter’s article, “The New International Standard on the Practice of Risk Management – A Comparison of ISO 31000:2009 and the COSO ERM Framework,” they summarize ISO 31000:2009 which is an improvement on the traditional operational risk management process. Some of the key improvements highlighted in the article deal with risk identification, ownership, and education.

Don Mango and John Major collaborated to write “Measuring the Market Value of Risk Management.” This article takes a finance-based approach to risk management and suggests measuring the value of risk management by observing how the shareholder is impacted.

Jason Alleyne’s article, “Perspectives on Variable Annuity Guarantees,” relates pricing VA products to risk appetite. By discussing the product development process in a risk context, this article explores how product design and underlying assumptions impact product risk profiles. He successfully demonstrates how a transparent pricing philosophy should result in better understood risk metrics.

Louise Francis has written an interesting summary of the presentations at the ERM-II Systemic Risk Workshop: “How Can We Keep it From Happening Again.” The symposium was sponsored by the ERM Institute International, the NAIC’s Center for Insurance Policy and Research, the Robinson College

of Business of Georgia State University, and the Joint Risk Management Section of the SOA/CAS/CIA. The presentations are based on the themes of “Systemic Risks” and “Implications for the Insurance Industry and its Effective Regulation.”

Finally, Steven Siegel wrote an article discussing the successful 2010 ERM Symposium call for papers which includes abstracts from the three winning essays from the last round.

Enjoy this issue! ■



Ross Bowen, FSA, CFA, MAAA, is vice president, profitability management at Allianz Life Insurance Co. of North America in Minneapolis, Minn. He can be reached at Ross.Bowen@allianzlife.com.

Diverse Perspectives on Risk Management

By A. David Cummings

SINCE OUR LAST NEWSLETTER, we've made some transitions on the Joint Risk Management Section Council. We have bid farewell to those who have completed their terms as council members, and we have welcomed a new class.

I'd like to thank those whose terms have recently ended. Thanks to Matthew Clark (our previous chair), Steve Craighead, Don Mango, Barbara Snyder, and Judy Wong. A special thanks to Wayne Fisher, who temporarily filled a vacancy on the council until the elections were held. All of these individuals have made important contributions to the work of the section, and we know they will continue to help establish actuarial expertise in the world of risk management.

We welcome the new council members who were recently elected: Kip Bohn, Stephen Lowe, Glenn Meyers, Mark Scanlon, and Stuart Wason. We look forward to the contributions they will make as well.



A. David Cummings, FCAS, MAAA, is vice president and chief actuary at ISO Innovative Analytics in Bloomington, Ill. He can be reached at *david.cummings@iso.com*.

As I look at the membership of the current section council, I am impressed with the diversity of backgrounds that these members represent. Of the 12 members of the council, four are fellows of the Casualty Actuarial Society. We also have three council members who practice in Canada. We have some council members who work in consulting, in regulation, and in insurance companies. This diversity of perspectives is important for the section to accomplish its mission of supporting research and education with regards to risk management.

This diversity on the section council mirrors the diversity in the membership of the section. We are a unique section because we are jointly sponsored by the CAS, the SOA and the CIA.

Effective risk management often requires the inclusion of many different perspectives in order to identify risks and manage them appropriately. Many of today's top

risk management issues require a broad and inclusive perspective. Beyond the actuarial perspectives that our section members represent, the perspectives of product managers, auditors, legal counsel, and public relations professionals can be vitally important. Many different types of professionals are skilled at managing risk within their own fields of expertise. Understanding the approaches they use can help to expand our toolset in identifying, quantifying, and managing risk for the enterprise.

Our 2011 ERM Symposium will be an important forum to gain a broader perspective. Planning for the symposium is well underway now. The program is shaping up to be full of interesting sessions, featuring leading speakers from across the insurance and financial services sectors—and beyond. The symposium will also showcase some of the latest research in risk management issues. I hope you'll mark your calendars for March 14-16, 2011 in Chicago.

The Joint Risk Management Section will continue to provide opportunities to gain exposure to different viewpoints. This newsletter itself plays an important role in doing that. I hope you enjoy the reading, and we welcome your perspectives as well. ■

The Fabric of ERM

A stronger ERM fabric—woven from all four strategic strands—should help firms avoid embarrassing exposures in the future.

By Alice Underwood and David Ingram

Editor's Note: This article first appeared in the December 2009/January 2010 issue of The Actuary. It is reprinted here with permission

FOR A COMPANY TO GET THE MOST OUT OF ERM, it needs to find the right weave of the four ERM perspectives to best suit itself.

If Enterprise Risk Management (ERM) is what it claims to be, then it is at its core the discipline of managing risk across an entire enterprise. But there are many different types of enterprises, from the pinstriped financial world to the tough, blue denim collars of manufacturing.

Banks believe they invented ERM, as the antidote to their out-of-control trading desks. Insurers see risk management as their birthright—but the underwriters and actuaries whose uneasy truce defines the sector have very different ideas of what risk management means. Long-lived firms in other business sectors are comfortable that their own approach to risk is all that is needed. Basel II/III, Solvency II and COSO/ISO31000 are the fundamentally inconsistent roadmaps to these divergent approaches. And to the enduring consternation of disciples of each of these styles of ERM, a number of firms flaunt the dictates of all three, yet continue to survive and sometimes thrive.

From this tangle, we can identify four distinct approaches to the management of enterprise-wide risk. These four ERM strategies can be called Diversification, Loss Controlling, Risk Trading and Risk Steering. We will consider each of these in turn, demonstrating that each represents a complete management system, with its own sensible way to accomplish different goals.

Are each of these strategies really ERM? Yes—in the sense that each can be used to manage risk across an entire enterprise. That proposition gives some practitioners pause. But recognizing that ERM is a fabric woven from four different threads can help every firm to weave them together in the manner that suits them best; there's no need to be constrained to the off-the-rack plaids and stripes that are the standard offerings.

DIVERSIFICATION

Many ERM practitioners see diversification as the non-strategy strategy. Those who follow a diversification

approach may appear simply to be rejecting organized ERM. But diversification is part of the risk management strategy of many—perhaps most—firms, and it can absolutely be applied in an enterprise-wide fashion.

When concentrations of risk are monitored at an enterprise-wide level, this is Diversification-based ERM. To moderate its risk profile, the firm seeks to undertake a broad range of activities whose risks are unrelated, and to maintain an appropriate balance among these activities. The key limit applied is a concentration limit.

The best practitioners of this approach constantly monitor their risks, staying alert for any change that would markedly increase the risk of one of their ventures and thereby skew the spread of risk.

The popular investment strategy of periodic rebalancing is at its core a diversification strategy. Buying and selling the losers and gainers is intended to keep the risk of the portfolio at a predetermined balance.

Diversification is also the fundamental idea behind insurance. It is the principle that enables insurers to assume risks from many individuals, whereas those individuals cannot bear the risk alone. Following the law of large numbers, diversification is best achieved with a very large pool of independent risks of similar size and risk characteristics. When insurance companies send a fraction of their biggest risks off to a reinsurer, they are motivated by the desire to maximize the benefits of diversification.

A very few insurance firms explicitly apply diversification at the strategic level, as a major theme of their ERM process. Modern conglomerates, on the other hand, have elevated this approach to become their driving principle.



Alice Underwood, Ph.D., FCAS, is an executive vice president with Willis Re Inc. and leads the Actuarial Services team for Willis Re North America. She can be contacted at alice.underwood@willis.com.



David Ingram, FSA, CERA, FRM, PRM, is senior vice president for Willis Re Inc. He can be contacted at dave.ingram@willis.com.

CONTINUED ON **PAGE 6**



LOSS CONTROLLING

Loss Controlling is a fundamental risk management activity that seeks to restrict exposure to potential losses or risks. Almost all businesses do this to some degree; the internal audit function and other ways of controlling operational risks typically fit this category.

In banks and insurance companies, the major Loss Controlling activities include risk underwriting and the establishment of exposure limits. Exposure limits for nonunderwriting risks, such as interest rate and equity exposures, can be enforced by using asset-liability matching and hedging. In nonfinancial firms, Loss Controlling adds a physical dimension. This is addressed by safety and industrial engineering programs—as well as by insuring physical property risks to set a limit on potential exposure. Supply chain and raw materials risks are managed by a variety of techniques, including but not limited to hedging. And in all types of firms, Loss Controlling strategies help to manage foreign exchange and liquidity risks.

Traditionally, each of these risks was managed in isolation. But Loss Controlling becomes an enterprise-wide approach when all the firm's risks are measured on some comparable basis. Then management can decide whether to retain or reduce exposure to certain risks based on a view of the firm as a whole.

The development, maintenance and interpretation of comprehensive risk models that can be used to evaluate

all risks on the same basis are relatively new phenomena. Often, when such a model is first deployed, and management sees the company's actual risk profile, they realize that some risks are managed very tightly while others are essentially ignored. In the context of a Loss Controlling approach to ERM, risk models are most often used to conduct stress tests that help prepare the firm for the worst-case situation.

RISK TRADING

Modern ERM can be traced to the trading businesses of banks. Hard lessons from uncontrolled trading led to the development of improved management processes and standards. A major element in these systems is the valuation—in other words, pricing—of risks. Management of risk through Risk Trading activity can be applied on a transaction-by-transaction basis. But applying a consistent view of risk pricing across all risks leads to a Risk Trading form of ERM.

Many property and casualty insurance and reinsurance companies are pure Risk Trading firms. They focus on their combined ratio (the ratio of claims plus expenses to premiums). Health insurers often have the same Risk Trading focus. They consider premium inadequacy their main risk—and, in fact, many firms in these sectors have failed to maintain adequate premium levels over a period of years.

When these firms shift to an enterprise focus for their risk management programs, they start to think about using economic capital and a cost-of-capital approach to standardize their pricing risk margins. These firms may also establish risk limits that relate to the amount prices may deviate from the “standard” by-the-book rates.

Life insurers often use a Risk Trading ERM strategy if universal life or deferred fixed annuity products comprise a significant portion of their portfolio. For such products, there is a target interest rate margin and a regular discretionary process for setting the interest rates that are credited to their customers. These firms sought a comprehensive approach for managing interest rate risk when they began to vary the required margin between investments and liabilities based on the credit quality of the investments.

RISK STEERING

The activities most commonly described as ERM today are those that incorporate risk considerations into a comprehensive process for firm-wide risk capital budgeting and strategic resource allocation, with an eye to enhancing firm value. We call this Risk Steering ERM. At a macro level, information obtained from ERM systems can be used to optimize the company's risk portfolio. Proposals to grow or shrink parts of the business, and opportunities to offset or transfer different portions of the total risk position, can be viewed in terms of risk-adjusted return. Some firms employ this approach only for major ad hoc decisions on acquisitions or divestitures; others use it all of the time.

This top-down risk management process typically uses an economic capital model as its key reference point for risk, and the key limit applied is the amount of economic capital any one activity is allowed to consume. The planning cycle then will include a capital budgeting process that incorporates the capital requirements and expected return on capital associated with planned future business. Consideration of a business plan is evaluated as a potential allocation of capital to support that business activity, and financial results are measured on a risk-adjusted basis. This includes recognition of the economic capital necessary to support business risks—as well as the risk premium, loss reserves, and duration issues for multi-period risks such as credit risk or casualty insurance. A few firms that are using a Risk Steering ERM process have also created an incentive system tied to the risk-adjusted financial results.

Taken together, these activities can be seen as broadly similar to strategic asset allocation processes that allocate investments among classes to achieve the optimal return for choices along the efficient frontier. In fact, some insurers that use Risk Steering do employ the efficient frontier concept and plot their businesses on a risk versus reward graph using economic capital instead of standard deviation as the risk axis.

HYBRID APPROACHES

Firms that try to follow only one of these approaches to risk management will find their system lacking at one time or another. Banks found that their risk trading systems failed to prepare them for adverse situations

that occurred much more frequently than their models had suggested, so they began to augment with some stress tests out of the loss controlling sphere. But without an understanding of the differences in perspective underlying these divergent risk management systems, many managers felt as though they had been asked to put socks on a fish.

Gaining an understanding of each of these risk management systems—and recognizing that each can be applied on an enterprise-wide level—offers practitioners better perspective on how the different strands can be woven together.

USING ALL FOUR SYSTEMS

The strongest ERM systems leverage the capabilities of all four approaches. Each strategy may come to the fore for a particular type of risk or a particular market environment.

For example, until someone develops a market for operational risks, those risks will be best managed using a loss controlling approach—leaving the price-focused trading approach to risks that are actually traded, and applying model-centric steering to risks that the firm can actually choose not to take.

At the strategic decision-making level, a view of the current risk environment may influence which of the four approaches takes center stage (see “The Many Stages of Risk” in the December ‘09/January ‘10 issue of *The Actuary*). This four-fold approach can be thought of in terms of a four-page risk dashboard, with one page for each of the four approaches to ERM. In this context, a major responsibility of the chief risk officer is to select the best order for these four pages at any point in time, based on the current and most likely emerging environment. (This is the process called Rational Adaptability in “The Full Spectrum of Risk Attitude” in the August/September 2010 issue of *The Actuary*.)

In the immediate aftermath of the 2008 financial crisis, some felt that the emperors of ERM had no clothes. We suggest instead that their ERM garments were not constructed from the best cloth. A stronger ERM fabric—woven from all four strategic strands—should help firms avoid embarrassing exposures in the future. ■

The New International Standard on the Practice of Risk Management – A Comparison of ISO 31000:2009 and the COSO ERM Framework

By Dorothy Gjerdrum and Mary Peter

ISO 31000:2009 – BACKGROUND

“Risk Management – Principles and Guidelines” is the title of the new international standard on the practice of risk management. Also known as ISO 31000:2009, it was published in November of 2009. The standard was

created by a working group that included technical advisors from more than 20 countries. In a series of six meetings over several years, the group revised the Australia/New Zealand risk management standard (AS/NZS 4360:2004) to create a standard that can be used by a wide variety of organizations in any country for any type of operation, regardless of complexity, size

or type. The new standard references definitions that are laid out in a related ISO document, Guide 73 (also published in November, 2009), which is a compilation of risk-related definitions and terms. Another closely related document is the standard on the process of risk assessment (ISO 31010), also published in November of 2009.

THE IMPORTANCE OF RISK MANAGEMENT & ITS EVOLUTION IN THE UNITED STATES

The basis for ISO 31000 follows this trajectory:

1. All organizations exist to achieve their objectives;
2. Many internal and external factors affect those objectives, causing uncertainty about whether the organization will achieve its objectives;
3. The effect this uncertainty has on an organization’s objectives is “risk.”

The management of risk, therefore, is central to the livelihood and success of all organizations.

Within the United States, this represents an expansion of the practice of risk management. The field of operational risk management grew out of industrial safety practices and the purchase of insurance. Therefore many organizations with traditional risk management programs included hazard identification, safety and loss control, workers’ compensation, insurance procurement, self-insurance administration, claims oversight and contractual risk transfer as key functions. Those practices have been evolving and become more integrated in the past 35+ years, but the focus on operational hazard risks and the transfer and financing of those risks is still at the core of the practice.

One of the key differentiators between traditional operational risk management and this new practice of risk management as defined in ISO is the linking of key risks and the risk management process to an organization’s strategic objectives. Other differentiators include identifying risks beyond insurable or industrial safety risks (including strategic, reputational and financial risks), expanding the responsibility for managing risk broadly across the organization to “risk owners” and defining a framework for managing risk that will build resilience and continual improvement throughout the process.

The ISO standard outlines a long list of the attributes of effective risk management, which includes improving corporate governance, financial reporting and stakeholder trust. When done effectively, the management of risk will raise awareness of the need to identify and treat risk throughout the organization and improve the identification of both opportunities and threats, as well as including emerging risks in the process. It will improve controls as well as operational effectiveness and efficiency. The successful implementation of risk management helps organizations comply with relevant legal and regulatory requirements and international norms. The process of risk management establishes a reliable basis for decision-making and planning, which includes the appropriate allocation of resources for the entire process. Some of the more traditional attributes of operational risk management are also included in the standard, including enhancing health and safety performance, environmental protection, improving loss prevention and incident management and minimizing



Dorothy Gjerdrum, ARM-P, is executive director of Gallagher’s Public Entity and Scholastic Division. She can be reached at Dorothy_Gjerdrum@ajg.com.



Mary Peter is director of Enterprise Risk Management at Eide Bailly and can be reached at mpeter@eidebailly.com.

losses. And from a wider organizational perspective, the standard states that effective risk management will improve organizational learning and resilience.

The ISO standard is intended to address a wide range of stakeholders, including those responsible for developing risk management policy (e.g., policy makers), the staff members responsible for ensuring that risk is effectively managed (as a whole or for a specific project or activity), the people and departments responsible for evaluating whether risk is being managed effectively (such as audit) and for developers of standards and codes of practice.

The standard states that it can be used by any public, private or community enterprise, association, group or individual. It is not intended to be specific to any industry or sector. It is also not intended as a compliance standard.

THE PRINCIPLES, FRAMEWORK AND PROCESS OF RISK MANAGEMENT

The ISO standard outlines the principles that make risk management effective, the framework in which risk management occurs and the process for managing risk.

THE PRINCIPLES

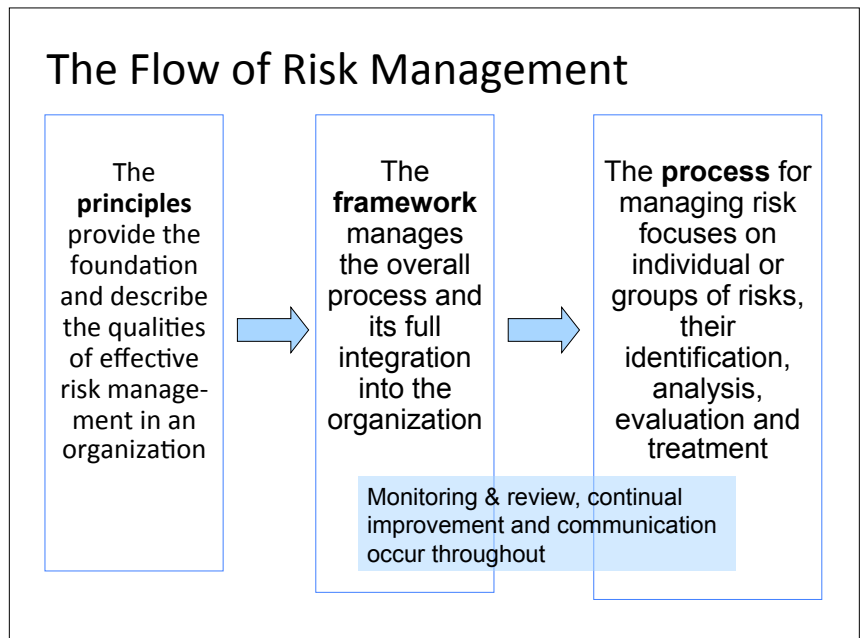
The principles that govern the risk management process establish the values and philosophy of the process. The principles support a comprehensive and coordinated view of risk that applies to the entire organization. Risk management principles link the framework and practice of risk management to the strategic goals of the entity. The principles also help align risk management to corporate activities.

THE FRAMEWORK

ISO 31000:2009 emphasizes the development of a framework that will fully integrate the management of risk into the organization. The framework assures that the corporate-wide process is supported, iterative and effective. That means that risk management will be an active component in governance, strategy and planning, management, reporting processes, policies, values and culture. The framework provides for the integration of risk management, reporting and accountability. It

is intended to be adapted to the particular needs and structure of each organization.

The component parts of the framework include establishing the mandate and commitment to risk management, designing the framework for managing risk (which includes understanding the organization's internal and external context, establishing a risk management policy, integration of risk management into organizational processes, internal and external communication and reporting and allocation of appropriate resources), implementing the risk management process (details follow), monitoring and review of the process and continual improvement of the framework.



CONTINUED ON **PAGE 10**

The New International Standard ... | from Page 9

THE RISK MANAGEMENT PROCESS

The core of the risk management process incorporates the five steps of a traditional operational risk management process (identify risks, analyze risk treatment options, select the best response, implement risk mitigation and controls and monitor results and revise as necessary). In the ISO model, they are central to the process of managing both individual and portfolios of risks. A significant difference from the traditional process is that the ISO model includes the elements of ‘establishing the context’ and continuous ‘communication and consultation’. Before you begin the process of assessing risk, you must establish the detailed context, which sets the scope and risk criteria for the process. Then, in addition to the core steps of the process, the ISO Standard identifies two key functions that should happen continually throughout the risk management process: 1) Communication & Consultation, which needs to be built into the process and involve both internal and external stakeholders, and 2) Monitoring & Review, which occurs continually during the process.

Establishing the context of the risk management process will vary according to the structure and the needs of the organization. It will include activities like setting goals and objectives for risk management, and defining the responsibilities, scope, depth and breadth of the process. This is a critically important step in the process because it will assure that the risk management approach is appropriate to the organization, its risks and objectives. It also includes a detailed analysis of the internal and external stakeholders, environment and key drivers and trends that have an impact on the objectives of the organization.

Risk assessment is the overall process of risk identification, analysis and evaluation. Identifying risk includes understanding the sources of risk, areas of impact, events and their causes and potential consequences. The goal is to create a comprehensive list of risks, including risks that may be associated with missed opportunities and risks out of the direct control of the organization. A comprehensive review allows a full consideration of potential effects of risk upon the organization.

The purpose of analyzing risk is to understand everything possible about risks, including the causes and sources, consequences and likelihood of occurrence. Existing controls and their effectiveness and efficiency are also taken into account.

The purpose of risk evaluation is to review the analysis, criteria and tolerance of risks in order to prioritize and choose appropriate risk treatment methods. An organization’s legal and regulatory environment and its internal and external context will also be considered at this stage. The evaluation process helps organizations make appropriate decisions about whether and how to treat risks.

Risk treatment involves selecting one or more options for modifying risks and implementing those options. It is a cyclical process that assesses a risk treatment, determines whether the residual risk is at a tolerable level (and if not, which additional treatments need to be implemented) and assessing the effectiveness of treatments.

Communication and consultation must take place throughout the process and should include both internal and appropriate external stakeholders. Risk management cannot succeed if it does not consult with and engage stakeholders in the process.

Monitoring and review is critical to the process because it assures that controls are effective, lessons are learned, risks will be appropriately addressed and the organization will be resilient and ready for change.

COMPARISON OF ISO AND COSO

The comparison of a few key definitions will illustrate key differences between ISO 31000 and the COSO ERM Framework. The COSO ERM Framework is a complex, multilayered and complicated directive that many organizations have found difficult to implement. ISO provides a more streamlined approach that is easier to digest. ISO is based on a management process, and through tailoring the process for each organization, it integrates into existing management and strategic initiatives. The COSO model is control and compliance based, and that contributes to it being difficult for traditional risk managers to embrace. If COSO were implemented by an organization’s internal audit team, there is the problem of having the program audited by the same people who enacted it; ISO allows for the independent audit function to occur during the monitoring and review phase. COSO was authored by auditors, accountants and financial experts; ISO was authored by risk management practitioners and international standards experts.

“ A significant difference from the traditional process is that the ISO model includes the elements of ‘establishing the context’ and continuous ‘communication and consultation’.”

Key Term or Description	ISO 31000:2009	COSO ERM Framework
Scope.	This International Standard provides principles and generic guidelines on risk management. It can be used by any public, private or community enterprise, association, group or individual. Therefore, this International Standard is not specific to any industry or sector.	This definition (of ERM) is purposefully broad. It captures key concepts fundamental to how companies and other organizations manage risk, providing a basis for application across organizations, industries and sectors. It focuses directly on achievement of objectives established by a particular entity and provides a basis for defining enterprise risk management effectiveness.
Risk management, defined.	Coordinated activities to direct and control an organization with regard to risk.	Enterprise risk management is a process, effected by an entity’s board of directors, management and other personnel, applied in strategy setting and across the enterprise, designed to identify potential events that may affect the entity, and manage risk to be within its risk appetite, to provide reasonable assurance regarding the achievement of entity objectives.
Risk, defined.	The effect of uncertainty upon objectives.	The possibility that an event will occur and adversely affect the achievement of objectives.
Risk appetite, defined.	The amount and type of risk that an organization is willing to pursue or retain.	A broad amount of risk an entity is willing to accept in pursuit of its mission or vision.
Risk assessment, defined.	The overall process of risk identification, risk analysis and risk evaluation.	Risks are analyzed, considering likelihood and impact, as a basis for determining how they should be managed. Risks are assessed on an inherent and a residual basis.
Risk management process	Continually and iteratively : Communicate and consult • Establish the context • Risk assessment: o Identification o Analysis o Evaluation • Risk treatment Continually & iteratively: Monitor and review	<ul style="list-style-type: none"> • Internal environment • Objective setting • Event identification • Risk assessment • Risk response • Control activities • Info & communication • Monitoring

CONTINUED ON PAGE 12

The New International Standard ... | from Page 11

Reviewing ISO and COSO together may provide the opportunity for risk management practitioners and auditors to integrate and strengthen their activities. Depending on your organization's view and success with COSO, it may be beneficial to review how ISO may provide an approach to design a path that would be more effective toward accelerating growth and profitability across the enterprise.

CONCLUSION

For internal auditors and traditional risk managers in the United States, it is important to remember that this new ISO 31000 standard is intended to build upon what is already being done well and expand your view about risk. For decades, traditional operational risk managers have been incredibly creative and forward-thinking about risk finance and risk transfer techniques. Internal auditors have been focused on the control mechanisms with respect to mitigating risk. Organizations have not been as forward-thinking about identifying a broad range of risks (beyond insurable risk, beyond hazard identification, beyond emergency planning or disaster pre-

paredness) or addressing cumulative or crossover risks. COSO ERM supports and can expand upon the internal financial control concepts of Sarbanes-Oxley for companies in the United States. Its objectives look to improve organization performance through better integration of risk management, strategy, control, and governance.

The authors believe that there is more in common between the two standards than in opposition. If you have fully implemented COSO, there may be no need for you to consider switching your format to the ISO standard – as long as you recognize the weaknesses of COSO and compensate for them. On the other hand, if you have not been able to achieve full implementation of COSO, you could switch to ISO without losing any ground, and you would likely simplify and strengthen your process during the transition.

A real strength of this new ISO 31000 risk management approach is the identification of risk owners and the necessary widespread education about risk—both within and without your organization. It increases accountability and strengthens communication. The link to business objectives (at all levels) strengthens both the relevance and the importance of risk management. Ultimately, the ISO 31000 standard provides a vehicle to make risk management central to the success of an organization, and an intimate part of key processes such as planning, management and governance.

Dorothy M. Gjerdrum, ARM-P, is executive director of Gallagher's Public Entity and Scholastic Division. She leads 300 Gallagher insurance brokers and specialists dedicated to public sector clients across the United States, focusing on issues of risk management, exposure identification, pool operations and enterprise risk management. In addition to leading the broker group, Dorothy provides consulting and risk management services to select Gallagher public sector clients. She is chair of the ISO 31000 US Technical Advisory Group.

Mary Peter is Director of Enterprise Risk Management at Eide Bailly LLP and leader of their ERM consulting services. She brings over 20 years of risk management experience, including 10 as a corporate risk manager. Mary designs and implements client-specific ERM programs, training, and deliverables to respond to regulatory requirements and strategic objectives of her clients. She is a member of the ISO 31000 US Technical Advisory Group and co-chair of an ERM Roundtable bringing traditional risk management and audit disciplines together. ■

RESOURCES

- COSO ERM Framework, www.coso.org
- ISO 31000, Guide 73, ISO 31010 can be purchased in US\$, www.ansi.org

A few important acronyms:

TAG = Technical Advisory Group. Each participating country had a sponsoring organization (in the US, it was ANSI) which formed a TAG comprised of experts from various industries and disciplines. In the US, ANSI delegated the TAG administration to ASSE.

ASSE = the American Society of Safety Engineers. ASSE is the world's oldest and largest professional safety organization.

ANSI = the American National Standards Institute. ANSI oversees the creation and promulgation of thousands of norms and guidelines for US business operations.

COSO = Committee of Sponsoring Organizations of the Treadway Commission

COSO II or COSO ERM = COSO Enterprise Risk Management – Integrated Framework Published in 2004.

ISO = the International Organization for Standardization. ISO is based in Geneva, Switzerland and is the world's largest developer and publisher of international standards.



CERA

Chartered Enterprise Risk Analyst
CREDENTIAL



An Enterprising Approach to Risk.

Learn more about the CERA credential at
www.ceranalyst.org/CERA-News

Measuring the Market Value of Risk Management

By Don Mango and John A. Major

Editor's Note: This article was previously published in Risk Management magazine and is reprinted here with permission.

FEW WOULD ARGUE THAT RISK MANAGEMENT is not valuable to organizations. It improves quality control and processes, mitigates damage and downside, and generally increases the operational efficiency for all types of companies. While we can quantify and measure these benefits at the business line level, understanding the more holistic value of risk management remains elusive. In particular, organizations are struggling

with how to best determine the market value of risk management strategies. One promising framework, which draws on techniques and concepts from actuarial science and financial economics, not only provides the ability to quantify market value but can also drive greater consistency in assessing risk-return tradeoffs across a range of risk management efforts.



Don Mango , FCAS, ASA, CERA, MAAA, is a managing director at Guy Carpenter & Company, LLC, in Morristown, N.J. He can be reached at Donald.F.Mango@guycarp.com.



John A. Major, ASA, MAAA, is a senior vice president at Guy Carpenter & Company, LLC, in Norwalk, Conn. He can be reached at john.major@guycarp.com.

Before delving into this framework, let's take a step back and examine how financial risk modeling, cash flow discounting and dividend policy are used in determining market and franchise value.

At a very simplified level, a firm's earnings equation might look like this:

$$\text{Earnings} = \text{Revenues} - \text{Expenses}$$

Some portion of earnings is retained or reinvested back into the company. The remainder is distributed or returned to the shareholders:

$$\text{Distributed Earnings} = \text{Revenues} - \text{Expenses} - \text{Retained Earnings}$$

This distributed earnings stream is a fundamental driver of the value of an ownership stake. In fact, equity analysts attempt to forecast the value of publicly traded firms based in part on estimates of future earnings patterns. They convert a stream of earnings into value through cash flow discounting—converting a possible series of earnings payments spread out in the future into a single net present value (NPV). This is based on the fundamental economic premise that money in hand today is worth more than money in the future.

In mathematical form, the discounted dividends model of equity valuation looks like:

$$\text{Shareholder Wealth} = \text{NPV} (\text{Expected Future Dividend Stream})$$

Generally speaking, there is no rigid relationship between a firm's market value and the capital it holds. If market value is less than capital, a firm is a takeover target because it could be liquidated at a profit. Conversely, if the market value is above the capital, the excess market value is called franchise value. The aim of management is often said to be the creation of shareholder value but, more specifically, the objective is to build franchise value.

DISTRIBUTE OR RETAIN EARNINGS?

All companies regularly face the decision of allocating net revenues (profits) between retained earnings and dividends or share buy-backs. A central issue is the opportunity to invest retained earnings and the cost of financing alternatives. A firm can finance new projects or investments through either internal (retained) or external capital sources. Under the theory of perfect capital markets, a firm should distribute all earnings it does not need in the immediate future and simply issue more equity to finance new initiatives. However, in the real world, returning money to shareholders and re-issuing equity incurs transaction costs. Even worse, if a firm finds itself in financial distress and needs external financing to keep operations afloat, potential investors may be unsympathetic in the price they charge for that financing. The high cost of such distressed financing is an incentive to retain earnings as an internal capital cushion.

CAPITAL POLICY IN AN INSURER

This earnings distribution question is structurally similar to the capital decision facing insurers—a decision that actuarial science has studied for decades. Initially the insurer capital decision was framed as, “Select an initial capital amount so as to minimize (or at least control) the probability of ruin—the point where the capital runs out.” Policyholders should care about this probability because it represents the likelihood their insurer will not be able to pay future claims.

In 1957, Bruno de Finetti proposed changing the focus from ruin probability to the value of shareholder dividends distributed to owners. The equation for insurer capital under his optimal dividends model is:

$$\text{Change in Capital} = \text{Profits} - \text{Dividends}$$

The objective is the maximization of owner wealth rather than the minimization of ruin:

$$\text{Shareholder Wealth} = \text{Maximum} \{ \text{Expected Value} [\text{NPV} (\text{Future Dividend Stream})] \}$$

Since companies are faced with an infinite variety of dividend strategies, the challenge is to pick out the best one to maximize shareholder wealth. In the model above, the future stream of dividends is discounted back to the NPV at some appropriately chosen risk-adjusted discount rate. And because profits—and therefore dividends—are unpredictable, the average (expected value) must be taken over the range of possibilities. The result is the discounted dividends model for valuing a firm.

DIVIDEND STRATEGY

The possible paths of future dividends depend on the starting point, i.e., the amount of capital in hand today. Too little capital, and the high probability of insolvency means that dividends may not stream for very long. Adding a little capital might be worth a lot in terms of shareholder value.

On the other hand, with a lot of capital, additional infusions of capital may not do much to change the future of dividends and, therefore, shareholder value. The



relationship between the level of a firm’s capital and its market value is not a straight line but a curve, specifically the M-curve.

Similar to the questions in the ruin theory, we are still asking about initial capital and risk management strategies. But the first question is: What is the optimal dividend strategy? De Finetti solved this in a simple case with no risk management. It amounts to a “barrier” strategy, in which all excess capital above a threshold level is returned by dividends or share repurchases to the owners. No such returns are made when capital is less than the threshold.

Over the next 50 years, researchers used increasingly sophisticated mathematics to extend de Finetti’s model in a number of directions, including risk management and the possibility of recapitalization. Our focus is on a form of these models that we call the de Finetti-Levy Asset Value of Optimized Risk, Equity and Dividends (FLAVORED) model:

$$\text{Change in Capital} = \text{Predictable Earnings} - \text{Random Losses} + \text{Capital Inflows} - \text{Dividends}$$

Here, the random losses follow a so-called Levy distribution, combining “normal” fluctuations with catastrophic jumps. A particular novelty of this model is that the level of predictable revenue can be a function of the current level of capital. This reflects the now well-established phenomenon of insurance customer risk aversion. Customers want their insurer to pay claims

CONTINUED ON **PAGE 16**

Measuring the Market Value ... | from Page 15

when and if the need arises. If they feel the insurer is not on completely solid financial ground, they penalize the insurer by not accepting premiums as high as they would tolerate otherwise. This penalty exceeds the actuarial “fair value” of the risk of nonpayment of claims. The other new element here is the capital inflow. Shareholders would consider this a “negative dividend” or worse, because it comes with a cost.

The market value equation for a FLAVORED model looks like this:

$$\text{Shareholder Wealth} = \text{Maximum } \{ \text{Expected } [\text{NPV} (\text{Future Dividends} - (1+k) * (\text{Future Inflows}))] \}$$

In this equation, the factor “k” is the cost of raising external capital. Under normal circumstances, a large firm can expect to issue new equity with underwriting and administrative fees totaling around 5% or so. However, the financial distress of a firm after a catastrophic loss might not be considered “normal circumstances” and could raise the factor k significantly. In conditions of extreme uncertainty, there is a chance that investors in the capital markets could require expected capital gains amounting to several multiples (i.e., hundreds of percent) as a cost of injecting new capital.

THE VALUE OF RISK MANAGEMENT

So what, then, is the value of risk management? When properly publicized, risk management can be an important ingredient in managing public perceptions, and it can help companies avoid scandals and reputation-damaging headlines. Moreover, by reducing earnings volatility, risk management evades the “signaling problem” where equity analysts are not sure whether a downturn is merely a temporary fluctuation or a sign of deteriorating earnings potential.

While these are very real benefits, it is hard to put a price on them. Yet “doing” risk management incurs direct costs, whether it is buying an insurance contract or instituting a safety program. And even though risk management may yield monetary benefits such as cost savings, those savings are often not enough to offset the direct costs. This is particularly true of risk transfer programs; one cannot expect to collect consistently more in claims than one pays for insurance. Ultimately, the intangible benefits of risk management may not be

sufficient to convince a hard-nosed CFO to cut a check for a particular initiative.

In economic terms, the market value of a risk management program is the difference between the market value of the firm with the program and the value of the firm without the program. FLAVORED models provide a framework for calculating how risk management protects franchise value.

Risk management affects the change-in-capital equation in two ways. The net costs may decrease predictable earnings and therefore dividend flows, but more importantly, risk management favorably alters the probabilities of random losses. Risk management, therefore, reduces the likelihood that a catastrophic loss will push a firm into bankruptcy—a development that would stop dividend flows altogether. Additionally, a firm with a solid risk management program is less likely to reach the point of financial distress, which leads to customers who are less willing to do business, employees that are less willing to stay on board and business partners that are less willing to extend credit on favorable terms. It is also less likely that a firm will have to turn to capital markets to raise money (at a net cost) to continue normal operations.

All of these effects can be captured and quantified in a FLAVORED model. By examining a firm’s value as it would operate with or without a particular risk management strategy, we can compute the contribution of the strategy to shareholder value and pinpoint the most favorable option.

AN EXAMPLE

Setting up and solving a FLAVORED model is a complex operation. The relationship between levels of capital and the probability distribution of profit and loss must be formulated, and numerous parameters such as the discount rate, growth rate and external capital costs must be estimated. The solution proceeds by computer-based numerical methods applied to the optimization of stochastic differential equations.

Nonetheless, we can gain insight into the method by considering a highly simplified example. Consider an insurance company with \$10 billion in capital and \$5

“By examining a firm’s value as it would operate with or without a particular risk management strategy, we can compute the contribution of the strategy to shareholder value.”

billion of franchise value, adding up to a total market cap of \$15 billion. The insurer faces the risk of hurricanes and earthquakes, with a probability of 2.5% that it would sustain \$2 billion or more in losses in a year and a 1% probability of losing \$2.5 billion or more. In addition, a \$2 billion loss will trigger a ratings action, which in turn would require significant price cuts to retain business volume. Such price cuts, if maintained, would effectively wipe out the \$5 billion franchise value. With substantial uncertainty in the capital markets, we can assume that post-catastrophe external financing would be unavailable.

This hypothetical firm has an opportunity to buy an excess-of-loss catastrophe reinsurance program attaching just under \$2 billion and providing \$500 million in limit. At what price would the program add value to the firm? The assumptions combine to suggest there is a 2.5% probability that a catastrophe will cause the firm to lose its \$5 billion in franchise value. The reinsurance program would reduce that probability to 1%. The benefit of this reinsurance program to shareholder value is the reduction in the expected loss of franchise value. Ignoring complicating factors such as the time value of money, the effect of the reinsurance premium

on the level of capital, etc., this value is approximately $(2.5\% - 1\%) * \$5 \text{ billion} = \75 million . Therefore, if the premium for the program is less than \$75 million (or 15% rate on line), it would provide a net increase to shareholder value.

AVOIDING NAVEL GAZING

By focusing on sources of franchise value, the approach outlined by the FLAVORED model provides a comprehensive method for assessing the impact of risk management initiatives. Potentially any risk to franchise value—operational as well as financial or catastrophe—can be represented in a systematic way, allowing the market value of risk management programs to be calculated and compared with a single yardstick.

By focusing on shareholder value, companies can avoid ineffectual “navel gazing” when assessing the benefits of risk reduction and the costs of risk management initiatives. The risk/reward preferences that truly matter are not those of management, but those that stem from the larger business environment, which also includes customers, employees, business partners and investors. ■



Don't Be Left Behind!

SOA Members
Have you attested compliance with the SOA CPD Requirement?
As of March 1, if you have not attested your status is now listed as "Pending" in the SOA directory.

THERE ARE THREE EASY STEPS:

1. Log on to the SOA membership directory and click the SOA CPD Requirements button on the main page.
2. Indicate whether you have met the SOA CPD Requirement.
3. Identify which method of compliance was used.

You must attest or be considered non-compliant. Go to SOA.org/attestation for more information.

Perspectives on Variable Annuity Guarantees

By Jason Alleyne, Ben Neff and Min Yang

CONSIDER FOR A MOMENT WHAT LESSONS we would be drawing upon today if the financial crisis had resulted in the bankruptcy of a large insurer brought about by their large book of Variable

Annuity guarantees. Luckily for the industry the VA guarantee is still a relatively young product concept in the history of insurance and such a failure did not materialize. However, the recent crisis did see the birth of the word “de-risking” in the VA guarantee product space. This would seem to indicate that product designs had escalated to a point where they were only sustainable in certain “benign” economic environments.



Jason Alleyne FSA, FCIA, FIA, FRM, is VP & Chief Pricing Actuary at BMO Life Assurance and works in Toronto, Canada. He is the chair of the SOA's research project on Variable Annuity Guarantee Product Risk Evaluation Approaches. He can be reached at jason.alleyne@bmo.com.



Ben Neff, ASA, MBA, is a client support specialist at GGY AXIS in Indianapolis, IN. He can be reached at bn@ggy.com.



Min Yang, FSA, is an actuarial programmer at GGY AXIS in Toronto, Ontario. She can be reached at my@ggy.com.

I have recently been handed the product development portfolio of a growing life insurer in the Canadian market. My company does not currently underwrite investment guarantees on its accumulation annuity book. The motivation for this article is to record some of my considerations in examining the viability of these high risk products within the context of what's occurred recently and what lies ahead in the foreseeable future.

THE PRICING PHILOSOPHY

I begin this journey as any student of Stephen Covey's “Seven Habits of Highly Effective People” with the

mantra, *start with the goal in mind*. As a stock company the goal is always to write profitable business that grows and enhances the franchise value of our organization. With this in mind, it is clear that I need to communicate to my Board of Directors why I believe this product—despite the spate of negative press to the contrary, is still a viable profit winner for a diverse life insurer.

The more I reflect on this I become critically aware that I must make transparent the pricing framework that will underpin the product design and profit measurement of my proposal. Pricing is really the cornerstone of good business management. Pricing ultimately must identify “On what am I betting my risk capital; and what's the potential payoff.” To put it another way, I must define an Economic Capital measure that meets the approval of the Chief Risk Officer, and to ensure that the expected return on this capital investment will be sufficiently large and highly probable to justify the “bet.”

Involving the key decision makers early in the process is critical to the success of any new venture. But it is even more so when the perception is that VA guarantees are complex products that have the potential to push a company into insolvency.

The key pricing concept here is that it is important to understand the key risk drivers for this type of product. Traditional life insurance relies on the law of large numbers and the benefits of risk pooling among largely independent risks. Variance from the mean will be relatively small and is often quantified by PfADs or deterministic risk margins. Investment guarantees do not have this mitigating feature. Market risks are all exposed to the economic system and all exposures can turn against the company at once. The key risk drivers in this context are the market drivers—e.g., equity growth rates, fixed income yields, correlations, equity market volatility and interest rate volatility, foreign exchange rates, credit spreads and liquidity. The corporate function of most companies would have a view on how these factors are modelled in forecasting the business plan as well as possibly the economic capital setting exercise. This is an important input into the pricing philosophy.

Consider for a moment that the product might be exposed to a number of future economic environments; assume for simplicity there are 1,000 such scenarios. The pricing decision will then present itself as a distribution that either fits with the company's risk appetite or not. Visually a fit would occur when the "weight" of the risk capital "bet" is properly balanced by the expected "value-add" of the business venture. In theory the scenarios should be the ones underpinning the economic capital or risk measurement of the business. And the value metric should be one that is fairly well understood such as ROI, or profit margin. In this framework it is possible to agree upon the risk appetite boundary, namely, what would be a viable product.

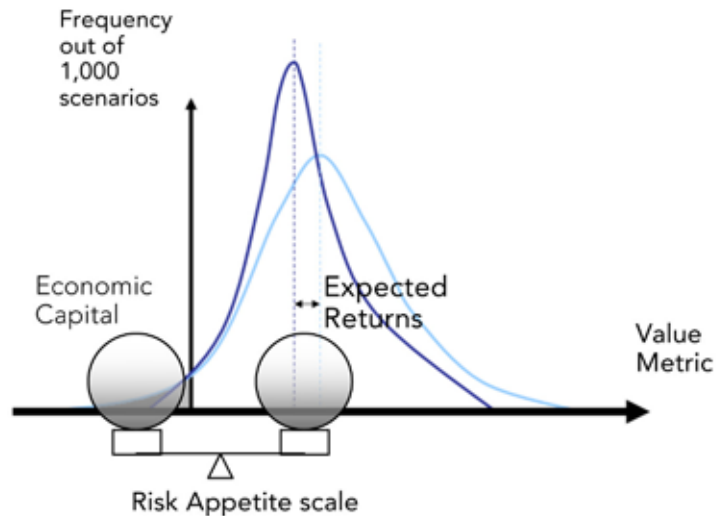
THE PRICING PARADIGM

Defining the risk appetite is a critical first step. But that in of itself does not tell us how to set the price of the product. The second important consideration is the pricing paradigm, namely how to first establish the rates for the product. To put it another way, the question is how to determine the risk premium or margins that fit within the established market place.

In general there are two approaches to risk pricing: (1) set price relative to observable market prices, i.e., risk neutral pricing or (2) establish one's own view, here referred to the actuarial approach (real world simulation).

The premise of risk neutral pricing is that there is an underlying law of one price (the market price of risk), and that the market's efficiency will force a convergence of any similar product/risk to conform to the landscape of existing prices in the market. Risk neutral pricing requires the existence of a deep and liquid market, in which case there isn't any one market maker who can arbitrarily alter the price landscape. In the typical short-term equity option and equity futures market this is certainly the case, and the risk margin or market price of risk is observed in the familiar implied volatility surface. Pricing a short-term option within this framework is essentially an exercise in interpolating between observable prices (or observable implied volatilities).

For long-dated options, such as those implicit in a VA guarantee rider, it is not so straightforward to assume



that one can apply risk neutral pricing. For one thing, there certainly is not a deep and liquid market to reference for a list of implied volatilities. Also the contracts are not as homogeneous as the standardized contracts that trade on the exchange. Certainly many academics would have some pause in recommending a risk-neutral approach to this problem. To go this route there would certainly need to be some thought given to setting the implied volatility. The Milliman Hedge Cost Index would be worth reviewing as one potential source for doing so.

The other pricing approach would be to form an understanding of the price of risk as a value measure *above* the historical performance of the underlying risk drivers. By using a real world economic scenario generator model (fitted to relevant historical data), and to use this to simulate the risk components of the investment guarantee, one might be able to estimate the price that satisfies the funding of future guarantees with x percent probability. To put it another way, a price might be constructed such that say 70 percent of simulated future economic scenarios will result in over funding of the risk. Obviously there is some subjectivity in setting the 70 percent, but one could reverse engineer the prices in deep and liquid markets to see whether the confidence level is roughly in line.

In using this approach, the model used to simulate the product performance must encompass all economic

CONTINUED ON PAGE 20

risk factors—equity growth rates, interest rates, correlations, market volatility, foreign exchange and credit spreads. This could again tie in with the work by the corporate risk or capital management team. Unlike the traditional actuarial pricing that might use a singular profit measure, scenario based pricing uses a multi-dimensional measure. This will consist of desired levels for the tail measure, and various hurdle metrics for the profit percentiles around the mean (e.g., 50 percent-ile, 60 percent-ile, 70 percent-ile).

At the end of the day, this is simply a way of coming up with an initial price that might be reflective of market conditions. Finally, keep in mind that pricing is both a science and an art. So there is not likely to be one exactly right methodology. Instead there needs to be an element of judgement and trial-and-error in establishing the pricing paradigm that best fits with the risk being priced.

BASE CONTRACT DESIGN

Once an approach to setting the risk appetite and a market consistent pricing approach has been determined, the next important factor is the product design.

Risk is best controlled by good product design. Risk management is useful in reducing risk exposures to within some acceptable tolerance. But the risk design is what ultimately determines the exposures in the first place.

On the base contract there are several areas that could be considered in reducing the overall risk of a VA guarantee rider. First of these is the fund type. The more volatile the growth rates of the underlying funds, the more unstable will be the revenues generated by the rider fees and also the more costly will be the guarantees. So the first decision point is whether to support fully managed funds, exchange-traded-funds (ETFs) or index funds. For an initial offering, it might be prudent to offer only index fund guarantees. For more sophisticated players, and if there is a long history of performance records for their managed funds, then it might be possible to consider these more risky fund types.

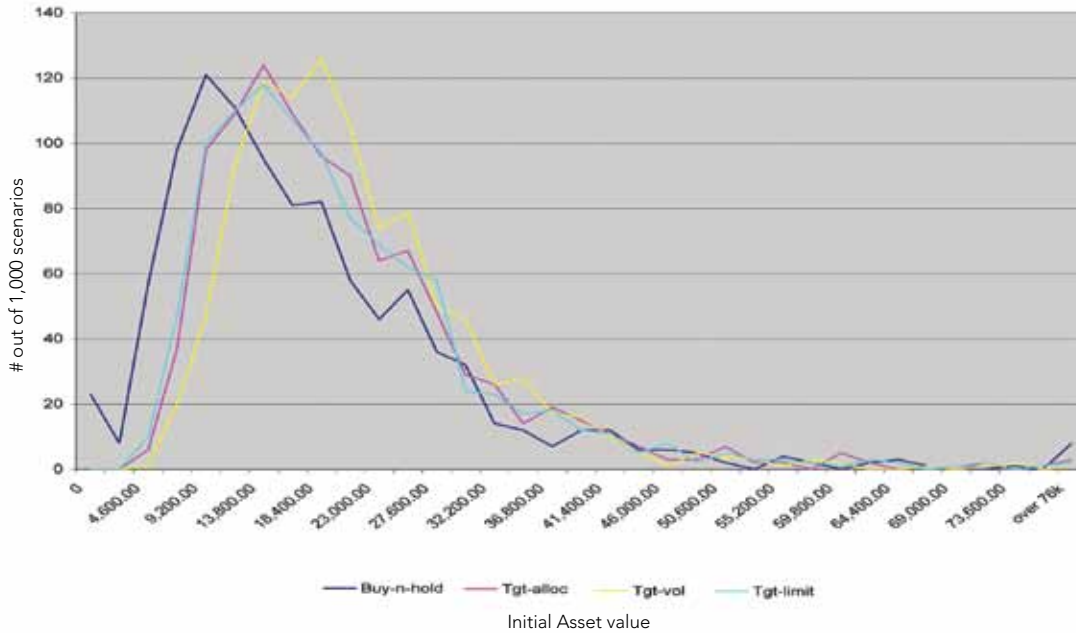
The second consideration is the fee structure. For this discussion, I am assuming that the rider fee and base

fee are considered as one style. The traditional fee is a spread or fund-based compensation. This style of fee is countercyclical to the risk; namely the benefit payout will be greatest at the very moments that the revenue generated will be the lowest. A flat fee or one based on the initial deposit is a better risk design that stabilizes revenue regardless of the market movements. More recently, fees have been engineered to move with the market cycle, namely more active markets and greater fund volatility would result in greater fees. This is certainly a benefit to the risk profile of the investment guarantee, but might be difficult to explain to the policyholder.

And the third consideration on the base underlying contract is the design of the fund allocation rule. In the typical allocation approach, the fund might have a mitigation mechanism that rebalances to a target proportion in a fixed income portfolio. This target allocation fund style would therefore sell off (buy into) equity to purchase (by selling) bonds when equity markets go up (down). From an investor perspective this has an attractive built in risk mitigation benefit over a buy-and-hold strategy. Furthermore, it is common to enhance this approach by setting a trading band in which the equity proportion can grow or fall before target allocation rebalancing kicks in.

A relatively new strategy that might offer a better risk profile to the investor is to consider rebalancing out of equity during volatility regime shifts. There are two benefits from this strategy. The first, from an investor's perspective, is that this strategy will outperform in the typical pattern of a market recession due to the relative persistency of volatility regimes. In the typical market down turn event, an increase in market volatility often precedes a sharp market decline; and this is followed by a subsequent fall in interest rates. If the fund rebalances away from equity during the volatility regime change, the fund will avoid most of the equity hit, and benefit from the gain on fixed income asset class during the subsequent fall in interest rates. The second benefit of this strategy is that it is designed to control the implied volatility of any guarantees on the fund value to within a narrow band. This in turn will ensure that any hedging of the investment guarantee will have more stable and predictable results.

FUNDING VALUE FOR 20 YEAR INCOME



RISK PROFILING OF FUND ALLOCATION STYLES

Consider for a moment a typical wealth management example, of 20 year accumulation followed by 20 years of regular income drawdown. We constructed a balanced fund built upon two fund types: (1) a single index equity fund modelled by a Lognormal-GARCH (1,1) process, and (2) a constant maturity bond fund targeting 10 year treasuries modelled with a CIR process. We examined four fund allocation styles: (1) buy-and-hold; (2) target allocation; (3) target allocation with limits and (4) target volatility. And we constructed two key value measures upon which to draw our conclusions—(1) The initial lump sum amount required to fund drawdowns of \$1,000 monthly; and (2) The frequency of deficits for a fixed lump sum amount and fixed drawdowns.

First examine the funding value distribution, and note that the example was constructed such that the average for all four styles is the same. The key take-away here is that the target volatility approach has the narrowest or tightest distribution of the four choices.

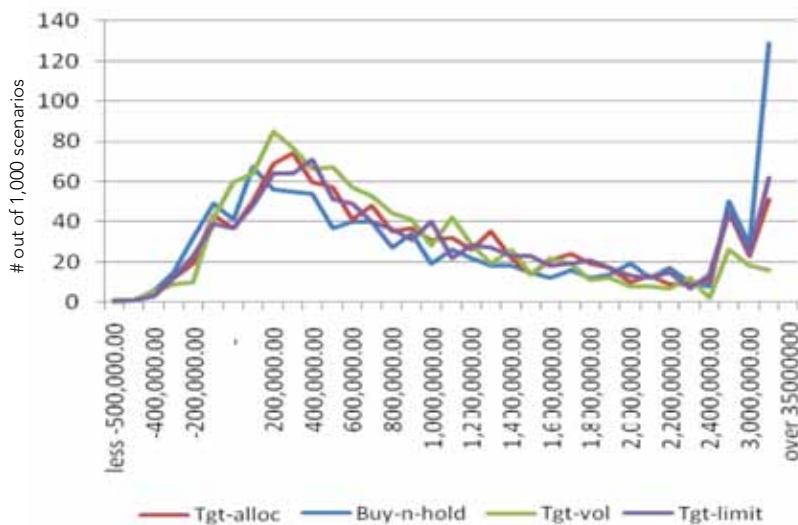
This is further highlighted by the detailed results in the right tail, in which target volatility has clearly the lowest exposure to extreme funding requirements.

Initial fund (\$)	Buy-n-hold	Target-allocation	Target-volatility	Target-limit
<=40,000	953	955	966	953
(40,000, 44,000)	14	14	10	16
(44,000, 48,000)	10	6	6	6
(48,000, 52,000)	2	9	8	8
(52,000, 56,000)	5	2	2	3
(56,000, 60,000)	1	6	4	3
(60,000, 64,000)	5	1	0	5
(64,000, 68,000)	1	1	1	1
(68,000, 72,000)	1	2	2	2
(72,000, 76,000)	1	2	2	1
>76,000	7	2	0	2

CONTINUED ON PAGE 22

The distribution of the frequency of deficits tell a similar story, where once again the target volatility fund allocation style has the tightest shape. Therefore an investment guarantee written on a fund using a target volatility allocation style would be less costly, ceteris paribus, than one using a traditional target allocation approach.

FREQUENCY OF DEFICITS



In conclusion, the target allocation approach has a mollifying effect on the variability of the underlying fund relative to traditional target allocation approaches. This has benefits both to the fund investor and to the insurer of its investment guarantee.

The analytic approach shown above is a useful one for evaluating the riskiness of various product features. To view a product performance as a distribution over multiple scenarios provides an understanding of the tradeoffs between the potential benefits and the downside risk to the client. The analysis can be done over the very same scenarios that are used in the economic capital framework to ensure consistency between the customer's risk outlook and the business outlook.

GUARANTEE RIDER DESIGN

Now turning to the guarantee style itself, I consider the issues here as divided between two key risk drivers: (1) the design features that impact on the market risk

exposures and (2) the policyholder behavioral exposures.

MARKET RISK FACTORS

The key market risk exposure is the basis risk inherent between the fund mapping and the risk mitigation strategy. Generally speaking managed funds included as underlying for investment guarantee riders were regressed against market indexes, which in turn had derivative contracts that could be used within a hedging program. This fund mapping implicitly determined the risk design of the rider. The fund mapping itself is designed to have a very high correlation to its mapped indices. However, the key lesson of the recent crisis is that the correlation might differ significantly between normal and distressed market conditions. Therefore it is actually more important to have a high R-squared factor in historical distressed markets than the normal periods because this is exactly when hedging cost will be extremely high. To increase the predictive power of the mapping, it might be better to group funds with similar characteristics into a fund of funds or a portfolio of funds. To do so would improve stability, because in any one fund a manager is likely to abandon his/her mandate to chase returns; but in a fund of fund these scope creeps net out such that the overall portfolio maintains its original risk profile.

Another risk consideration in the design of basis risk, is to charge for it. Namely, portfolios with higher volatility should be charged higher rider (and/or base) fees. This is quite common place in Canada, but not so in the United States

Another set of market factor considerations for product design is to utilize features that respond to the economic environment. One very good example of this would be to set the GMWB rollup rate based on the existing short term rates at the time the benefit base increases. Note that a fixed rollup rate exposes the hedging program to a step change at each anniversary that is near impossible to fund with only a delta position.

Note that generally, the market risk within a block of riders does not naturally benefit from any risk diversification—all boats sink in a falling tide. But clever risk design could engineer a natural maturity diversifica-

tion effect by setting benefit/payment start dates on an attained age basis. This would mean that a year's cohort of new business might have as much as a 10 year distribution of risk exposures. And this natural diversification could well mean the difference in a liquidity crunch.

BEHAVIORAL CONSIDERATIONS

The intensity of the risk of resets appears to be one that is well established—without fail recent de-risking involved reducing or removing the reset options in the contract. Resets do offer a powerful option to the policyholder, but the risk isn't only in the nature of the option, the risk lies in the fact that there is little data to evidence the level of rationality in using the option.

The key consideration in behavioral features is to understand the price of 100 percent rationality and to reverse engineer the level of rationality that is implicit in the "market" price. Rationality in a modeling context is probably best viewed within the framework of the scenario generator. It is probably not fair to model 100 percent rationality as perfect hindsight as would the financial pricing literature suggests; instead it does seem appropriate to set policyholder behaviour based on complete awareness of the underlying drivers of the economic environment (e.g., the instantaneous volatility in the case of a GARCH model).

An alternative risk design approach might be to offer fixed features such as look-back options or fixed ratchets. This would provide the same attractiveness of a reset product, namely one that responds to a rising tide, but at a controllable, predictable and known usage rate (namely 100 percent).

HEDGING

We have discussed a few risk design issues and certainly the above was not meant to be an exhaustive list. But hopefully the discussion demonstrates the framework in which to approach the decision making process. Risk design needs to work within the pricing philosophy and the chosen pricing paradigm, but also it needs to be practical and responsive to the market needs of the target client group. But what ultimately comes out of the design process needs to be managed to fit within the Board's risk appetite.

Therefore, the final key consideration in the development of new investment guarantee rider is the hedging program. If we consider that the market price might at best reflect that revenues (rider fees) would cover the guaranteed benefits in say 70 percent of the expected future scenarios, there is a considerable risk exposure in the tail. In the case of a GMDB, the exposure might not likely be realized due to the relatively small probability of death, and therefore the risk could be held open. But in the more typical case of any other guarantee type, hedging is used to reduce the tail exposure to an acceptable level to bring the product within the risk appetite of the company.

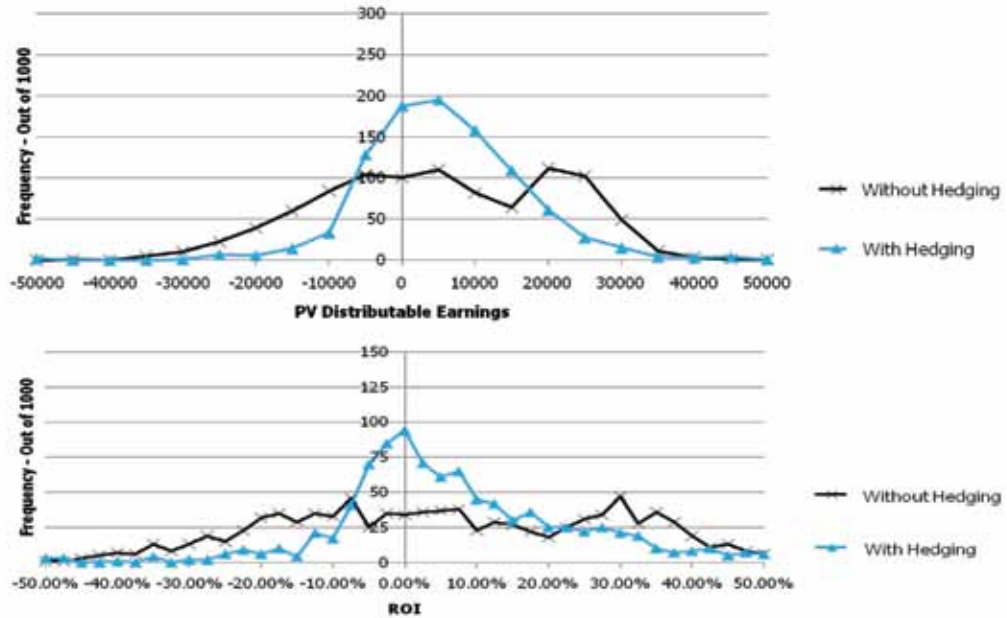
In this regard, I would recommend to position hedging evaluation in pricing as an exercise in reshaping the risk-reward performance of the product. With this in mind, the maximum expected returns from an investment guarantee product is when it is left un-hedged. In modelling the effects of hedging within the pricing of the product, hedging will necessarily reduce the expected returns but at the benefit of reducing the size and probability of excess losses. It is this reduction in the expected returns due to hedging that should be considered the "hedge cost." The pricing exercise would then be complete when the tail (expected excess losses) is brought within some risk budget limit (economic capital for the line of business), but that the expected returns are still sufficient to warrant a launch.

To do this type of analysis it is critical to include as much detail about the proposed hedge program in the pricing model. Also it is important to model the regulatory requirements, both reserve and required capital, to judge whether the hedges are effective on both an economic and accounting basis. Finally the value metrics used must be consistent with how Executive management views the business and that the product profitability fits within their risk appetite.

The following diagrams reflect some of the analytics that we've performed with an integrated pricing model to better understand the risk-reward of the hedging program in our product.

CONTINUED ON **PAGE 24**

Perspectives on Variable Annuity Guarantees | from Page 23



CONCLUSION

The investment guarantee contracts in the annuity market are an important product type that will likely remain a key line of business for the insurance industry. The recent crisis has resulted in some pause to review the product offerings in the market and how best to manufacture this risk going forward.

This discussion has highlighted the need to make transparent the pricing philosophy for evaluating this complex risk. Transparency of the pricing philosophy is important to gain buy-in from executive management, which in turn is critical in establishing a clear definition of the risk appetite for the product.

It is also important to decide on a pricing paradigm that reflects the organisations own view of this long dated risk, and the associated risk capital required to back it. The risk attenuating to all product features should be viewed with this in mind.

And finally the risk management aspects of hedging these complex long dated risks should be considered an art rather than a science. It is critical to evaluate the effective cost of a hedging program weighed against its benefit in reducing the expected excess losses. ■

Get the news. Now it's easier.

New look!

Improved navigation!

Organized for an easy read!

in this issue

Making News

Inside the SOA

Spotlight on Sections

Knowledge Matters

Research Front

In Memory

A Category of Its Own

Member Poll

making news

Actuary Listed Best Career of 2011

FSA Stuart Klugman quoted in this article about his profession.

Women Outlive Men, But Don't Plan for It

FSA Anna Rappaport is quoted in *Reuters* about the impact of retirement on women. The article reports that half of American women will live past age 85, but very few are planning for it.

[Back To Top](#)

Coming to you from e-news@soa.org

soanews | TODAY
e-newsletter

How Can We Keep it From Happening Again: The ERM-II Systemic Risk Workshop

By Louise Francis

ON MAY 11-12, 2010 IN ATLANTA, ERM-II (Enterprise Risk Management Institute International) sponsored the second workshop on Systemic Risk regulation. The first workshop was held in August, 2009, also in Atlanta. The National Association of Insurance Commissioners, the Joint Risk Management Section of the CAS, SOA and CIA, and the J. Mack Robinson College of Business at Georgia State University joined ERM-II as co-sponsors. Professor Shaun Wang and Wayne Fisher, executive director, ERM-II, served as co-chairs of the symposium.

A key objective of the workshop was to develop recommendations that could serve as input to regulators, leg-



Louise Francis, FCAS, MAAA, is the president of Francis Analytics and Actuarial Data Mining, Inc. in Philadelphia, Penn. She can be reached at louise_francis@msn.com.

islators and other policy makers in designing and implementing systemic risk regulation that can prevent future financial crises. Participants came from a diversity of disciplines, such as academe, regulation and business. Most

were from the insurance industry, though representatives of the banking industry participated as well.

A number of different topics were covered including: the definition of systemic risk, the insurance industry as a cause of systemic risk, the exposure of insurers to systemic risk, cross-country approaches to regulation for systemic risk, and how banks and insurers manage their exposure to systemic risk. Below are summaries of certain presentations.

PRESENTATION BY SHAUN WANG

According to Shaun Wang, there is a crisis in our valuation system; that is, the systems we use to value assets and liabilities. Fiscal and monetary policies, as well as accounting regulations, have dramatic impacts on asset values and therefore on the economy. Wang suggested that business schools focus on maximizing stakeholder value rather than maximizing shareholder value. Some key questions arising from the crisis are:

- What risk management metrics are needed, and which should be disclosed?
- How to manage principal-agent incentives? Incentives should not reward managers for taking on excessive risk or provide compensation for incomplete transactions (where liability is not extinguished so the true profitability is unknown).
- How does one test and manage in a value-add framework? That is, how much value is added net of the additional risk that's assumed?
- A methodology is needed to identify emerging risks, and require a systemic evaluation of the potential impact on the firm.
- How do regulators deal with escalating risk taking in a competitive environment?

Shaun Wang noted that new approaches to systemic risk management are needed including new ways of measuring and developing information about risk. He proposed new measures of risk that would augment financial reporting. Already, the EU is developing regulations for managing risk and the NAIC has a solvency modernization initiative. Though Solvency II calls for internal models, Wang believes that this would not prevent financial crises as many companies already employed models. These models were subject to various pressures in selecting key assumptions (note that Lewis made it clear in **The Big Short** that rating agency models were manipulated both by the raters and their customers, resulting in higher than merited ratings).

Wang believes that management failures are the cause of every business failure. Therefore an effective risk index must measure management behavior, as well as capture other factors.

Wang asked "Why don't actuaries do a good job in estimating loss reserves?" He believes a key source of reserve inaccuracies is that actuaries do not adequately consider the underwriting cycle. Using a table from work by David Clark (see "How to Create a Market Cycle," <http://www.casact.org/research/wp/papers/working-paper-clark-2010-03.pdf>) Wang suggests a key factor in reserve loss development are relative rate changes. Wang suggested that regulators will require reporting on such risk indicators as rates (per exposure

“ A key objective of the workshop was to develop recommendations that could serve as input to regulators, legislators and other policy makers in designing and implementing systemic risk regulation that can prevent future financial crises. ”

unit), employee turnover, and major organizations changes. Wang also suggests regulators will require a discussion of business models limitations. Wang recommended research on analyzing macro-economic trends and how they impact insurer’s business models and work to develop risk indices for various market segments.

PRESENTATION BY DR. STEPHEN HIEMESTRA

Dr. Stephen Hiemestra, providing a federal regulatory perspective from the Federal Home Finance Agency, defined systemic risk as “the probability that a large number of firms, especially financial firms, could fail during a given time period.” He fleshed these ideas out further in the Summer 2010 issue of *Risk Management*. He also noted that the “Too Big to Fail” corporations impose a systemic risk because their failure imposes a cost to society. Hiemestra noted that limited liability corporations are granted an option to “put” their losses to their creditors in the case of a bankruptcy, but a “too-big-to-fail” is given an option to put their losses to the taxpayer and yet still continue to function. Thus, there is an incentive to make riskier bets since they are in part made at the public expense. Hiemestra notes that campaign financing and lobbying tend to increase the value of this put and the share born by society. In addition, peddling for political influence tends to neutralize the efforts of anti-trust (and other) laws.

Hiemestra recommends adding risk management reporting requirements, including information about the accuracy of past model estimates, to financial disclosures. Hiemestra also believes that regulators should be required to intervene in “bubble markets.” He also addresses the inadequacy of current approaches to address bubbles. For instance, hedges and diversification tend not to be effective risk management in bubbles.

PRESENTATION BY MARY WEISS

Professor Mary Weiss, who has spent a sabbatical working with the NAIC, did a presentation on Systemic Risk and the U.S. Insurance sector. Weiss defines systemic risk as “the risk of adverse consequences that



reverberate across a large segment of the financial sector as a whole, posing a potentially grave effect on the economy.” Weiss’s research addressed the question “Can the insurance industry pose a systemic risk?” Some manifestations of systemic risk in insurance are: a run on an insurance company, reinsurance, and the correlation of losses. Weiss examined whether the failure of one or more insurers could cause a wider financial failure. Because no insurer currently has a large enough share of the insurance market she believes the industry does not have TBTF companies and it is unlikely that insurance companies can precipitate a crisis. On the recipient side of systemic risk, insurance companies have significant investments in bonds, stocks and other securities that are affected by system wide crises.

In all, Weiss concluded that the insurance industry is unlikely to expose society at large to systemic risk although they could be adversely affected by financial crises. In her opinion, insurance companies deserve input into discussions and planning about systemic risk. Weiss’s paper, which describes her research and her findings can be downloaded from the NAIC website, www.naic.org.

PRESENTATION BY THOMAS FREEMAN

Thomas Freeman, CRO for SunTrust, defined systemic risk as “a risk that affects an entire market or system, to just specific participants” and addressed how compa-

CONTINUED ON PAGE 28

How Can We Keep it From Happening Again ... | from Page 27

nies should manage exposure to systemic risk. Financial institutions need to implement a strategy to respond to systemic risk long before a systemic crisis occurs. “Taking early action to address systemic risk requires courageous leadership since it may run counter to the prevailing industry sentiment.”

PRESENTATION BY ALLAN MENDELOWITZ

Allan Mendelowitz, former Chairman of the Federal Housing Finance Board was the lunch speaker. His topic was “Systemic Risk: How’s that Working Out for you?” Mendelowitz illustrated that a simple plot of housing prices and household income over time provided a clear (and early) indication of the housing bubble and of an unsustainable trend. The post-bubble period has seen extremely high default rates where each vintage is worse than the preceding vintages. This is evidence of an extraordinary collapse of underwriting standards. Mendelowitz is an advocate for an Office of Financial Research (OFR) initiative. He believes the

broad-based daily collection of data across the financial services industry is a key to the success of a systemic risk regulator. The OFR concept is for an independent agency charged with collecting aggregate level information suitable for analyses and stress scenario modeling and aggregation in order to support systemic risk monitoring and regulation. More information about the organization promoting the data gathering initiative can be found at www.ce-nif.org. Though the concept has been attacked in the *Wall Street Journal*, it is backed by some large organizations and some brokers, whose back office operations might benefit from such legislation.

PRESENTATION BY ALLAN BRENDER

Allan Brender, a Canadian regulator, discussed the kind of regulatory structure that he suggests can prevent catastrophic systemic crises. Using the Canadian regulatory system as an example, Bender described the features of a system that he feels worked. A key factor is a system that is principals rather than rules based. Such a system is harder to arbitrage by searching for technicalities that

defeat the intent of the regulations. The Canadian system involves frequent on-site visits by the supervisor (including to foreign offices). Brender characterized the approach as “reliance based.” Brender noted that Canada’s banks weathered the financial crisis relatively well. Some life insurers, however, had to increase liability estimates significantly, causing a re-examination of internal models of VA products. ■



LIFE & ANNUITY 2011 SYMPOSIUM

SEEK KNOWLEDGE. GAIN SOLUTIONS.

SHERATON NEW ORLEANS
NEW ORLEANS, LA
MAY 16-17, 2011

The SOA Life Spring Meeting and Product Development Symposium are now one ... the 2011 Life & Annuity Symposium.

Don't miss this opportunity to expand your life and product development expertise—hear from industry leaders, get insight on hot topics and learn what you need to know to grow your career and company.

Here's what attendees of the 2010 premier Life & Annuity Symposium had to say:

- “A lot of opportunity was packed into a two-day meeting.”
- “I really liked the mini-seminar about product development that was embedded in the overall symposium.”
- “Informative and useful.”

Sign up today at www.SOA.org/LAS

Actuaries
Risk is Opportunity.®

Further information

Presentations can be downloaded from: <http://www.ermii.org/News/SystemicRisksmeeting2010.html>.

2010 Marks Fifth Year for ERM Symposium Scientific Papers Track

By Steven C. Siegel

THE 2010 ERM SYMPOSIUM marked the fifth year that a call for ERM-related research papers has been issued in conjunction with the symposium. As in past years, the goal of the call for papers has been to provide a forum for the very latest in ERM thinking and move forward principles-based research. Once again, the Call for Papers provided an opportunity for thought leaders and innovators to share their ideas and push the boundaries of ERM.

This was also a very special year for the ERM Call for Papers with the award presented by the Actuarial Foundation being officially renamed as the ERM Research Excellence Award in Memory of Hubert Mueller, with significant financial support from Towers Watson. Hubert Mueller was a pioneer in ERM and the award recognizes his significant and important contributions to the field. At the awards session, Patricia Guinn of Towers Watson gave a moving tribute to Mueller and noted his involvement in all aspects of furthering ERM and in particular, his tireless work benefiting the ERM Symposium. Special thanks to Tom Corcoran of Towers Watson for his work on behalf of the award.

For 2010, Fred Tavan again reprised his role as chair of the review group and led the group through the review of over 30 abstracts and papers. The papers review committee included Maria Coronado, David Cummings, Riaan DeJongh, Wayne Fisher, Hui Gan, Dan Oprescu, Nawal Roy, Matthieu Royer, Max Rudolph (previous Chair of the group), Greg Slone, Barb Scott, Richard Targett, Fred Tavan, Al Weller and Robert Wolf. As in previous years, choosing from among the abstracts for nine presentation slots at the symposium required a great deal of review and careful consideration.

The final task of the committee was to select the prize winning papers. The three prizes awarded at the symposium are: the Actuarial Foundation ERM Research Excellence Award in memory of Hubert Mueller for Best Overall Paper; the PRMIA Institute New Frontiers in Risk Management Award; and the Joint Risk Management Section Award for Practical Risk Management Applications.



From left to right: Neil Bodoff, the Actuarial Foundation 2010 ERM Research Excellence Award in memory of Hubert Mueller winner, the family of Hubert Mueller, Patricia Guinn, and Tom Corcoran



Fred Tavan, chair of the ERM Symposium Call for Papers

CONTINUED ON **PAGE 30**

2010 Marks Fifth Year for ERM Symposium ... | from Page 29



Patricia Guinn presents the 2010 Actuarial Foundation ERM Research Excellence Award in memory of Hubert Mueller to Neil Bodoff.

The award winners along with the paper abstracts are shown below. Awards were presented at the ERM Symposium Opening session held on April 12, 2010.

We wish to thank all the organizations and committee members for their support and for making this a success.

2010 Actuarial Foundation ERM Research Excellence Award in memory of Hubert Mueller for Best Overall Paper: "Discarding Risk Avoidance and Embracing Risk Optimization: Managing Reinsurance Credit Risk" by Neil Bodoff

ABSTRACT

Property-casualty insurance companies tend to focus on avoiding and controlling their exposure to reinsurance credit risk. This paper advocates switching from this risk avoidance and compliance mentality to a probabilistic and market based view in which one seeks to measure, hedge, exploit, and optimize risk.

2010 PRMIA Institute Award for New Frontiers in Risk Management: "Bayesian Risk Aggregation: Correlation Uncertainty and Expert Judgement" by Klaus Bocker, Alessandra Crimmi, and Holger Fink

ABSTRACT

In this paper we present a novel way for estimating aggregated EC figures based on Bayesian copula estimation. Contrary to the classical approach of using a single (point estimator) inter-risk-correlation matrix we derive a probability distribution of possible correlation matrices that enables us to tackle the important issue of parameter uncertainty. More precisely, we describe in detail how formal expert judgement can be performed and utilised to augment scarce empirical, resulting in a posterior distribution that contains all relevant information about the inter-risk-correlation matrix. We then present simulation algorithms based on Markov-Chain-Monte-Carlo methods that allow to simulate sample correlation matrices from different posterior distributions. Finally, we give a numerical example that



David Ingram (left) accepts the Joint Risk Management Section award from Fred Tavan.

serves to illustrate our new approach and, in particular, shows how important accuracy measures for aggregated economic capital and diversification benefits can be obtained by adopting a Bayesian perspective.

2010 Joint Risk Management Section Award for Practical Risk Management Applications: "The Human Dynamics of the Insurance Cycle and Implications for Insurers: An Introduction to the Theory of Plural Rationalities" by David Ingram and Alice Underwood

ABSTRACT

There has been a diversity of explanations for the insur-

ance cycle. Almost all of these assume that market participants share a common risk perspective and a common goal of profit maximization. But if we relax this assumption and allow for the plural rationalities suggested by Cultural Theory, as well as the idea from Cultural Theory that there is a reflexive relationship between the marketplace and market participants, a significantly different explanation arises. ■



Steven C. Siegel, ASA, MAAA, is a research actuary for the Society of Actuaries in Schaumburg, Ill. He can be reached at ssiegel@soa.org.



Investment SYMPOSIUM

Cautiously Following the Recovery Road Sign

Navigate the economic voyage.

THREE PATHS TO SUCCESS: Asset Class, Financing & Investment Risk Management and Investment Strategy.

TWO DAYS OF NETWORKING with investment professionals from diverse industries.

Visit www.investmentsymposium.org to learn more.

Actuaries
Risk is Opportunity.®

April 11-12, 2011
Millennium Broadway Hotel
New York, NY

JOINT RISK MANAGEMENT SECTION

Canadian Institute of Actuaries
Casualty Actuarial Society
Society of Actuaries

Non Profit Org
U.S. Postage
PAID
Carol Stream, IL
Permit No 475

475 N. Martingale Road, Suite 600
Schaumburg, Illinois 60173
p: 847.706.3500 f: 847.706.3599
w: www.soa.org

Risk
management