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Advanced Risk Management Seminar

New York, December 2002

by Cathy Ehrlich, David Ingram and Hubert Mueller

The World Trade Center site in New York City is immediately north of the site of the second annual Advanced Risk Management Seminar, which was held on December 5 and 6. Activity at Ground Zero was low that week. Many decisions still have to be made about future developments and memorials. Next door, inside the Marriott Financial Center hotel, the 75 attendees to the seminar were very active. The seminar was co-sponsored by the Investment Section and the Finance Practice Area. The co-chairs of the seminar, Dave Ingram and Larry Rubin, especially want to thank the 15 speakers who presented on 13 topics. In 2003, the Advanced Risk Management Seminar will be held as a joint meeting with the CAS ERM committee on July 29, 30 in Washington, DC. As of the press deadline for this article, there are 20 sessions planned for that meeting and over 30 speakers.

Opening Presentation – Evolution of Banking ERM –

Robert Mark, Black Diamond Enterprises

Banking risk management has evolved significantly over the years, according to Robert Mark, the former Chief Risk Officer for Canadian Imperial Bank Corporation and GARP Risk Manager of the Year in 2000. Mark provided examples of VaR calculation methods that have improved in complexity and accuracy over time as bank risk managers have learned more about their products, markets and available technology has grown. Pressure for the development of bank risk management has come from the increasingly complex products and instruments that banks have used in their business as well as the intense pressure for the bank regulators, particularly the Basel committee of international bank regulators. The three pillars of the Basel capital accords are the minimum capital requirements, the supervisory review process and the market discipline (disclosure) requirements. Best practice banks continue to evolve in their ability to perform completely integrated enterprise risk management.

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Hedging Equity Risk for Variable Products –

Marshall Greenbaum, Constellation Management and Sandeep Bidani, Bear Stearns

Both Marshall Greenbaum and Sandeep Bidani emphasized the embedded risks in the variable and equity linked products that have been sold by the insurance industry over the past 15 years. Greenbaum reviewed five options for variable product risk management: (1) Going Naked, (2) Reinsurance, (3) Securitization of M&E fees, (4) Dynamic Hedging and (5) Static Hedging. He talked through the steps that a company could use to determine the most cost effective hedging strategy that eliminated a the portion of the variable product risk a fraction of the cost of a risk elimination hedging strategy. Bidani discussed similar considerations regarding the equity linked annuity products. He provided information on principal protection notes linked to hedge fund performance, SPX variance. In addition, he described possible insurance product designs that were keyed off of available investment structures so that the problem of approximating a hedge against a unusual insurance liability would be greatly reduced.

Interest Rate Risk Management –

Cathy Ehrlich, Milliman USA

Interest rate risk management has been practiced at insurance companies for decades. Cathy Ehrlich gave an overview of the process including the sources of the risks, an evolution of the metrics used and the different management techniques employed. Metrics used by insurance companies have evolved from static measures like McCaulay duration to more dynamic approaches such as effective duration, VaR and CTE. These dynamic approaches measure the expected change in value or model the distribution of the change in value caused by changes in interest rates. Therefore, they depend on sophisticated models of the asset and liability cash flows and sophisticated models of the term structure. Term structure models vary by whether they are equilibrium or arbitrage-free, continuous or discrete time, single or multiple factors and whether they are normal or log-normal. In the end, they are all just models and none is "right" so care must be taken to choose the best model for the situation at hand. While it is relatively easy to check whether arbitrage-free models are properly calibrated, equilibrium models must be tested by whether they are biased, the distribution of interest rate changes and the prevalence of inversions. Although interest rate risk management is well established at insurance companies, new metrics, technologies and quantitative techniques have kept the process quite modern.

Credit Risk Management –

Kevin Strobel, Aegon and Dan Kaiser, Bear Stearns

The recent credit losses of the insurance industry served as a backdrop and motivation for Strobel and Kaiser's discussion of methods of quantifying and managing future credit risk. Strobel reviewed the approaches taken by the commercial credit analysis software packages and then walked through a detailed description of the home-grown credit analysis system developed at Aegon. That system was, in effect a multi regime approach where defaults, as well as recoveries, occurred at different frequencies in different regimes. This was then used within a stochastic process that was parameterized to have the desired fit to historical patterns and/or future expectations. Strobel described various methods for managing credit risk that all keyed off of monitoring systems that are detailed yet easy to use on a very frequent basis. Exposures need to be aggregated across bonds, mortgages, derivatives and liabilities.

Kaiser concentrated on the use of credit derivatives to manage insurer credit risk. The impact of these instruments on cash flow, liquidity and income is important information for the valuation actuary as well. Kaiser gave an example of a large portfolio that was restructured into three layers: a senior secured layer, a leveraged investment layer and a secured leveraged investment layer. Kaiser urged that companies should pay attention to structuring and managing their credit risk in good times as well as bad.

Risk Management Task Force Update –

Valentina Isakina, SOA, Hubert Mueller, Tillinghast and David Ingram, Milliman USA

Valentina Isakina provided an overview of the development and structure of the SOA Risk Management Task Force (see *Risk & Rewards* article February, 2003). She described the efforts to date of the RBC Covariance, Policyholder Behavior in the Tails, Extreme Value Models, Risk Management Metrics, Equity Risk Modeling and Health Risk Management subgroups. Huber Mueller presented a report on the Economic Capital Calculation and Allocation (ECCA) subgroup, which he chairs, including highlights of the survey that was conducted by that group in mid-2002. Slightly less than half of the almost 500 respondents answered that they were using economic capital in their work. Less than 20 percent of the respondents were using stochastic methods to determine economic capital. Over 80 percent of the respondents agreed with the basic definition of economic capital as "sufficient surplus capital to meet negative cash flows at a given risk tolerance level."

That survey found that quite number of basic pricing techniques are in use at various companies for different products.

Over 90 percent agreed that interest rate, pricing, credit and equity market risk should be included in economic capital and almost as many would include liquidity and operational risk as well. The ECCA group will be incorporating the survey results as well as a literature search into a specialty guide that should be completed in 2003. Dave Ingram then gave a report on the progress of the Pricing for Risk subgroup. That group, chaired by Todd Henderson, has completed a survey of pricing practices. That survey found that quite a number of basic pricing techniques are in use at various companies for different products. When similar methods were grouped, the survey showed that 34 percent of the respondents reported using some version of an internal rate of return method, 21 percent a premium margin method, 14 percent a return on equity method and 11 percent were using embedded value, with the remainder scattered over several diverse alternatives. A variety of methodology was found when the method of incorporating risk into pricing was asked. All five choices in the survey, capital allocation, risk adjusted profit target, stochastic scenario analysis, assumption PADS and assumption stress testing got significant levels of responses, with no apparent favorite. Ingram said that the Pricing for Risk group is in the process of developing a report on the survey to be published in 2003.

Risk Management as a Profit Opportunity –

Hubert Mueller, Tillinghast

Hubert Mueller provided an overview of key risks with current life and annuity products, covering economic, accounting, pricing and operational risks. The goal for insurance companies is not to eliminate risks, but to maximize their financial objectives, subject to a given set of risk tolerances and constraints.

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Hubert then provided an overview of current best practices for risk management, using the results of two recent surveys conducted by Tillinghast:

- A quarterly survey among North American life insurance CFO's
- A global ERM benchmarking survey, conducted in late 2002 among 94 companies worldwide

Some of the key findings which were obtained from the surveys include:

- Although companies are making steady progress in implementing ERM, few companies appear to be proactively managing the risks associated with equity-based products
- Companies appear to be adopting ERM for business reasons, rather than as a compliance issue
- General agreement that ERM can help executives with their most important business issues: earnings growth, revenue growth and return on capital (see Figure 1 below).

Hubert then provided a case study on the management of guarantees for equity-based products and some anecdotal evidence of companies exemplifying ERM "best practices." His conclusion was that more than a profit opportunity, risk management is an essential tool to avoid losing money.

Risk Management at the NY State Insurance Department Capital Markets Bureau –

Matti Peltonen, NYSID

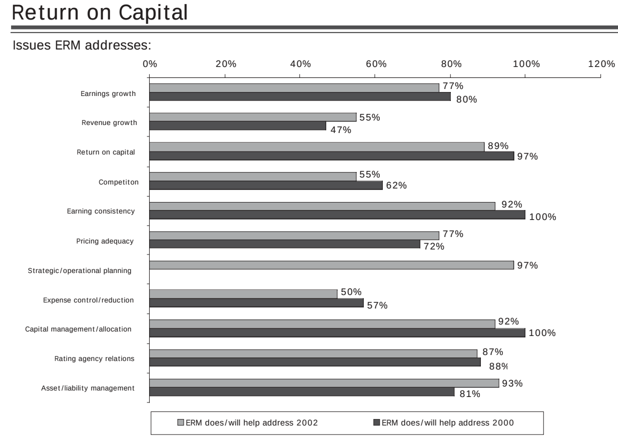
In 1999, the New York State Insurance Department established a new functional area to assist with the oversight of capital markets activities of the 1100 Life, Property Casualty and Reinsurance companies that it regulates. Matti Peltonen of the Capital Markets Bureau (CMB) gave a brief overview of the mandate of the bureau as well as a sampling of some projects undertaken by the bureau. Activities of the bureau have included financial analytics of the investment performance of companies, review of the control and corporate governance aspects of third party investment management agreements and analysis of securitization transactions such as the catastrophe bonds. The CMB adds a financial analytical risk based approach to the traditional balance sheet orientation of insurance department examinations. Peltonen showed how a number of metrics and analytical devices are used to develop "warning flags" used to target the company examination process.

Operations Risk –

Samir Shah, Tillinghast

Samir Shah explained three methods that can be used to model and quantify operational risks: systems dynamic simulation, Baysian belief networks and fuzzy logic. Methods rely on differing

Figure 1:
ERM Helps Address Earnings Growth, Revenue Growth and Return on Capital



Q.1 For each of the issue you have identified, please also indicate whether you believe ERM helps, or will help, address that issue. (n= varies - those who said issue was important now or three years from now)

Tillinghast - Towers Perrin

levels of historical data and expert opinion. These three methods use both data and expert input. Systems dynamic simulation is a method that has been primarily used in engineering sciences. It uses non-linear system maps to represent the causal dynamics of a system fuzzy logic uses linguistic variables and rules based on expert input. Bayesian Belief Networks (BBN) rely on a network of cause-effect relationships quantified using conditional probabilities. An example was presented where the fuzzy logic method was applied to the problem of modeling market conduct risk.

ERM and Operational Risk –

Mark Shaw, AFLAC

Mark Shaw provided a comprehensive review of risk management including a definition of risks, discussion of implementation issues and review of some major contributions to risk management literature from the CAS and the Institute of Chartered Accountants in the UK. His best practices list included the comprehensive inclusion of risks, senior management understanding of risks, management responsibility for risk management, aggregation of risks across the organization and a balance between control and flexibility. Shaw reminded everyone that many of the fundamentals of good risk management were already in place at most companies.

Legal Risk for Insurers –

Chris Tahbaz, Debevoise & Plimpton

The primary legal risk of insurers in the 1990s was the risk of market conduct class action litigation. Chris Thabaz provided a history of the industry class action problems and particularly the actuarial issues that were involved. The central allegation of the plaintiffs' bar was that "insurance products were designed/managed to over promise and under perform." Actuarial documentation has often been key to these suits. In the future, the plaintiffs' bar will offer new theories of "systematic" wrongdoing and actuarial documentation will continue to be a source of insight into company practices.

Mortality Risk -

Larry Rubin, Bear Stearns and Dave Ingram, Milliman USA

Mortality risk concerns for risk managers and pricing actuaries was the theme of presentations by Dave Ingram and Larry Rubin. Rubin gave examples of the impact of different levels of mortality on a long term care product where there is little historical experience and little opportunity to adjust pricing for changes in mortality levels. Estimation error in this pricing parameter can result in differences in calculated premiums of over 20 percent, according to Rubin's examples. Equally significant mortality risk was shown to exist related to estimates of mortality improvements at the later ages, which impacts both long term care and SPIA products. Data for projecting improvements at the later ages is also scarce and parameter estimation error is a significant possibility.

Implementing ERM –

Vinaya Sharma, Allstate

Vinaya Sharma discussed the practical issues that surround the process of bringing an enterprise risk management program into an organization. An organization needs to start with a frank assessment of where they are regarding risk assessment and risk management. Then the goals for ERM must be established, which leads directly to the development of the targeted approach for ERM. Sharma described the process that Allstate uses to bring the information within their organization together to aggregate risks. Individuals involved in the Enterprise Risk Team at Allstate come from 24 different departments. Lessons learned include the extent of turf issues in building an ERM process and the differences in the meaning of risk management to different key people across the organization.

Closing Remarks –

Dave Ingram, Milliman USA

Actuaries are often led to feel that the risk management practices of the insurance are behind the practices of Banks. Dave Ingram concluded the seminar by reviewing a list of areas where actuaries have made important contributions to insurance company risk management and often these developments came before similar bank risk management practices. Those areas include risk measurement and risk exposure reports, risk limits and risk control procedures, risk analysis of new products, investments and projects, RAROC and risk adjusted financial reporting, risk adjusted product pricing and economic capital calculations.

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