



SOCIETY OF ACTUARIES

Article from:

# Small Talk Newsletter

November 2004 – Issue No. 23

# The New Risk Management Professionals

by Narayan Shankar

## Introduction

There is a new awakening in the world of business that analytical and quantitative methods can be applied to model and manage risk. Business leaders are beginning to believe that a disciplined approach to managing risk can create shareholder value by reducing the likelihood of catastrophic “surprises” that damage their corporate reputation and result in financial losses.

This awakening, driven mainly by regulatory developments, began in the banking industry, as I will describe in this article. Recently, it has spread to other industries. The nudging of Congress and regulators, following the recent financial scandals, provided the necessary impetus.

New risk management professionals, recognized for their successes in banking risk management, stand ready to serve the emerging needs. These professionals are well equipped with science and theory. They are supported by a strong intellectual base, led by research programs in elite universities as well as some of the largest corporations in the financial sector.

Many of these practitioners, working in investment and commercial banks, hold doctoral degrees in hard sciences (such as nuclear physics, mathematics, econometrics, etc.) from prestigious universities around the world. They are very talented, trained in research—through graduate school and academic experience—and skilled in applying basic principles in creative ways to find solutions to many problems, including those in the business world.

The challenge for the actuarial profession is to join this new movement as a full partner. Actuaries have centuries of practice in risk management, and we describe ourselves as professionals who “model and manage risk.” However, the new risk management professionals, with no



affiliation whatsoever to the actuarial profession, are quickly establishing themselves as the risk management profession. “Risk management” is in the SOA vision statement—something hardly anyone reads—but it is squarely in the title of the new professionals. In this article, we will describe how this came about and provide additional background on the new profession.

## Actuaries and Risk Management

Since the early years of our profession, actuaries have been involved in modeling contingent events. The profession developed a repertoire of basic tools and techniques to support modeling and analysis. For the most part, a deterministic modeling approach was used that did not capture the intrinsically stochastic nature of contingent phenomena. That approach continues to this day in many areas of actuarial practice. One exception is the actuary who faces the highly dynamic problem of managing investment risk in the context of liabilities with embedded options. Many actuaries in this area are using sophisticated stochastic modeling tools.

Now let us consider the flip side of modeling and talk about managing risk. Historically, the actu-

arial approach to risk management was qualitative and intuitive. It depended heavily on “judgment” acquired from experience, rather than on a rigorous quantitative measure of risk. In fact, “risk” (or “adverse variability”) was not often formally measured by the actuary. This can be contrasted with the emphasis placed on quantitative measures of variability by the new risk management professionals.

A primary tool used by actuaries for managing risk was conservatism, i.e., the use of margins to minimize the risk of loss. A big area of emphasis has been the control of behavioral risks in contracting, including moral and morale hazards, through sophisticated policy features and underwriting techniques. A refined approach to the definition of risk classes, combined with precise measurement of the expected loss experience of each class, was a focus of actuaries, rather than quantitative methods to model and manage portfolio risk. These traditional approaches continue to be emphasized by actuaries in the life insurance industry. ▶▶

## Actuaries have evolved a sophisticated asset-liability approach for managing insurance risks and some actuaries are at the forefront of using these tools in their practice.

### ► Developments Since the 1950s

Theories of the measure and price of risk, as well as new tools for managing risk, emerged from the work of financial economists. They were developed in the context of pricing primary and derivative securities, with variability of returns and intrinsic price volatility taking center stage as formal measures related to investor risk. In the 1980s, these ideas were applied in a portfolio context to the management of risk in financial institutions—primarily in banks—and the new science of enterprise risk management was born.

### Risk Management in Banks

At the enterprise level, the central risk management issue in financial institutions is the amount of capital needed to protect against adverse business results. Financial institutions need to hold capital in order to give confidence to their customers (bank depositors, insurance policyholders, etc.) that liabilities will be honored even if the institution experiences unexpected losses.

Traditionally, bank liabilities are relatively simple, consisting primarily of checking, savings and time deposits, though more recently, banks are raising funds in the capital markets. There are generally no contingencies with respect to liability cash flows. Interest rates and guarantees are a factor in raising funds in the retail market, but most guarantees are very short term in nature. These considerations are more an issue for marketing and operations than for risk management.

In most cases, the operating liabilities of a bank are immediately callable, with or without penalties. But there is a normal pattern of withdrawals that is quite predictable, with some seasonality. The primary focus in managing liability risk is to avoid a “run on the bank.” This can generally be achieved by avoiding liquidity concerns, reputation issues or excessive losses on the asset portfolio.

Hence, the primary emphasis of risk management in banks is on the asset side of the balance sheet. Banks invest in marketable securities, currencies, mortgages, retail loans and business loans. They generally do not employ a “buy and hold” approach to investments, but consider them part of a trading portfolio on which they attempt to earn a spread over the cost of funds. The main risks faced by banks with respect to their investments are broadly classified as market risk and credit risk.

### Risk Management for Insurers and Pension Funds

Some actuaries are involved in managing enterprise financial risk at insurance companies and pension funds. Due to the complex long-term nature of insurance and pension liabilities, and the contingencies involved, risk managers at these institutions usually cannot take a simplistic approach to the liability cash flows, especially in those cases where the liability cash flows are dynamic.

Actuaries have evolved a sophisticated asset-liability approach for managing insurance risks and some actuaries are at the forefront of using these tools in their practice. However, many actuaries do not employ these tools for the management of risks, and sometimes not even for modeling them. Often, actuaries play a passive role, using their considerable talents in this area only for the fulfillment of the statutory asset adequacy analysis function. In order to fulfill the vision and mission of the profession, actuaries need to be actively engaged in managing enterprise financial risk. They are clearly positioned to take the lead in this area, if they will only do so.

In the pension area, the state of theory and practice in asset-liability management (ALM) lags that of insurance companies. In most cases, pension ALM reduced to the choice of investment policy of a 60/40 or a 70/30 allocation between equity and fixed income. This is based on the premise that a heavy weight toward equity is appropriate due to the long duration and implicit inflation indexing of the pension obligations.

The focus of pension actuaries was the plan sponsors and the management of their financial objectives. The incompatible goals of the IRS of prohibiting overfunding while ensuring funding adequacy led to a bizarre set of rules that created anomalous swings in funding levels through the course of a business cycle, complicating the development of a rational ALM strategy.

The involvement of pension actuaries in asset-liability analysis has increased. Actuaries need to take a leading role in tackling the tough theoretical and practical issues in pension valuation, funding and ALM.

The solutions may require significant legislative action to allow a better fit between theoretically sound risk management practices and permissible contribution strategies. Should there be a risk-based capital (RBC) measure for pension plans? We need thoughtful analysis of the issues and a dialogue on the financial and policy implications. With their understanding of the big picture, actuaries are better positioned than any other professionals involved with pension plans to do the analysis and propose creative solutions to the current challenges. ►►

► Bold, principle-oriented thinking is needed from actuaries. This is our turf, and we should be thought-leaders in this area. Unless actuaries are an integral part of developing solutions to these issues, addressing the balance sheets of pension trusts as well as plan sponsors, they risk being marginalized in an area that has historically been a pillar of the actuarial profession.

Like life actuaries, health actuaries face risk classification and loss estimation issues. They have focused on these micro-level risks and at the same time have tried to get a handle on the tough problem of forecasting health care inflation. At the enterprise level, a major risk faced by health insurers and HMOs is the prospect that cost and utilization of medical services will exceed the estimates built into premium rates. Health insurance companies have taken many creative measures over the last couple of decades to manage this risk. These risk management strategies are collectively known as managed care, and primarily address the liability (operating) side. Actuaries have been involved in these efforts. In the future, there may be new approaches that incorporate asset-based strategies and certain hedging techniques.

### Threats and Opportunities for Actuaries

It's time for actuaries to step up and be enterprise financial risk managers in traditional industries. The opportunities are there for the taking. However, these opportunities will

## Bold, principle-oriented thinking is needed from actuaries. This is our turf, and we should be thought-leaders in this area.

be there for only so long and we need to act fast, since senior management is beginning to see the need for an active enterprise financial risk function. The new risk management professionals can easily step in and "eat our lunch." That is already happening, with the appointment of chief risk officers within insurance companies from outside the ranks of the actuarial profession.

It is necessary for every actuary to break out of their passivity, and think consciously of themselves as "risk management professionals," rather than premium or reserve calculators. Chief actuaries need to think at an "enterprise" level, assessing risk and advising the CEO on threats and opportunities. It is the responsibility of every actuary to raise the overall profile of our profession and gain recognition as risk experts.

Risk management is dynamic and action-oriented. It involves making choices, reaching decisions and taking action. All the analysis in the world is wasted if no action results—the risk does not go away because it is analyzed, it only goes away when action is taken. Actuaries can be guilty of over-analyzing and under-managing. A first step in this ►►



## It is necessary for every actuary to break out of their passivity, and think consciously of themselves as “risk management professionals,” rather than premium or reserve calculators.

► process is effective communication. Actuaries can be the decision makers in some cases, but frequently they are advisors. Senior management is generally not aware of the risks that are present, nor are they equipped to even ask the right questions. It is not only the prerogative of actuaries to raise these questions and provide creative and reliable advice; it is their obligation.

We have emphasized the threat that actuaries face from the new professionals in the traditional areas of insurance and pension. For now, it looks like the nuts-and-bolts jobs in pricing and reserving still belong to actuaries, but the new risk management professionals are a strong competition for the enterprise-level analysis and decision-making positions. Indeed, they seem to be viewed as better equipped to understand the big picture and manage risk at the macro (enterprise) level.



Let us examine the other side of this issue. What are the opportunities for actuaries in nontraditional areas, such as banks? For the rest of this article, we will focus on how well actuaries are equipped to step in, from the perspective of technical knowledge. What comparative advantages and disadvantages do we have for success in these new areas?

### The Gap in the Actuarial Knowledge Base

Actuaries are generally not familiar with the tools and techniques used to manage risk in those cases where enterprise financial risk of the asset portfolio can be separated from that of the liabilities, as is the case in banks. While there is clearly a learning curve—and most actuaries will probably have to bone up on their mathematical and statistical knowledge—it is well within the range of their skills for actuaries to attain a mastery of the state of the art in asset risk management. Indeed, it is imperative that all actuaries have a general familiarity with the tools and jargon in this field.

The following two areas might be a good place to start. One is Extreme Value Theory, which deals with evaluating the probability of unlikely occurrences. By definition, capital is held to cushion against unlikely occurrences. So, having the knowledge to measure and manage risk at the enterprise balance sheet level is important. The other area of knowledge is modeling contingent cash flows on financial instruments, primarily options, futures and swaps that are frequently used to hedge risk or speculate in the financial markets. Derivative instruments are absolutely integral to asset management, so a working knowledge of them is necessary. However, a mastery of all the mathematics behind valuing these instruments is probably not required to work with them in the risk management field. There are software packages that do all the math.

We will provide a quick overview of the various types of risk analyzed by the new risk management professionals in banks, the current state of the art in their practice and the techniques used.

### Market Risk

The impetus for the birth of the new science of risk management was the fundamental question: How much capital does a bank need to cushion against market risk, i.e., the possibility of short-term losses on its trading portfolio of marketable securities? The key words here are “short-term” and “marketable securities.” It has been possible to develop precise mathematical and statistical methods to measure this specific risk. Note that while these problems are more ►►

► tractable than the ones actuaries work on in the traditional industries, solving them usually requires more advanced mathematical knowledge than most actuaries have.

Bank regulators proposed RBC requirements as a cushion against market risk. To correctly measure this risk and avoid unnecessarily onerous capital requirements, banks hired “rocket scientists” holding PhDs to develop the appropriate techniques. In the 1980s, investment banks had already discovered the value that advanced scientific training can bring—“rocket scientists” had been significant players in the development of new securities such as collateralized mortgage obligations and complex hedging instruments.

Once again, PhDs with advanced analytical training came through for financial institutions. Using mathematical and statistical tools, including concepts from traditional Extreme Value Theory, a solid body of knowledge has been created for measurement of market risk. This body of knowledge generally goes under the jargon of Value at Risk (VaR) methods. Knowledge in this area continues to advance.

Note that insurance companies also face market risk, but from a long-term rather than short-term perspective. Hence ALM methods, including the emerging work on contingent tail expectations, rather than VaR methods, are more applicable.

### Credit Risk

More recently, banks (led by bank regulators) have turned to the other basic categories of risk they face—credit and operating risk. The new risk managers are at work, and progress is happening. Credit risk for banks corresponds to underwriting risk for insurance companies. For banks, credit risk is present in both the operating portfolio of loans as well as the investment portfolio of bonds. The issue is being addressed scientifically, incorporating the idiosyncratic risk of individual customers, i.e., the underwriting risk in the traditional sense, as well as the systematic risk of business cycles.

Measuring and managing credit risk is harder than short-term market risk, which was addressed so successfully in the 1990s. Credit risk involves longer-term economic issues and selection effects familiar to actuaries. It is a harder problem, not so easily solved using advanced mathematics, but it is also one where actuaries have much relevant knowledge.

Actuaries have much to contribute in this area, having worked on similar problems for more than 100 years. Indeed, casualty actuaries, with their experience in man-

## Actuaries have much to contribute in this area, having worked on similar problems for more than 100 years.

aging underwriting risk through business cycles are in a position to lead the way. The new risk managers are going for the Holy Grail, i.e., the mathematical modeling of the business cycle and its interplay with credit losses.

Another approach taken is to reduce the credit risk problem to one of market risk by creating new traded instruments such as “credit derivatives” that securitize credit risk. Since market risk is already measurable, and credit derivatives provide liquidity, completeness and the opportunity to hedge, these new instruments offer a powerful way to efficiently manage credit risk. An increasing number of companies are trying to address market and credit risk in one cohesive risk management framework.

### Operating Risk

Perhaps the best area for actuaries to contribute is in operating risk, which includes such issues as fraud, internal controls, reputation, litigation liability, marketing risk, etc. Casualty actuaries have long made a market in many of these risks, and have vast amounts of institutional knowledge, data and experience in this area. The new risk managers are groping their way around, in many cases reinventing “the wheel.” Operating risk is a messy area of risk management, where measurement will never be reduced to a science and “experienced judgment” will remain important as a factor in risk management—a skill that actuaries possess.

For operating risk, prevention is often the best form of management rather than hedging, diversification and other portfolio-type solutions, which are the primary tools for handling credit and market risk. To the extent operating risk is managed through portfolio approaches, it is often transferred through insurance and pooled by casualty insurers, which is the reason that casualty insurers have a deep understanding of the general portfolio characteristics of such risks.

Even when insurance is an efficient mechanism for managing certain operating risks, the risk management tools center around “prevention,” with “insurable interest” and “loss sharing” being the primary devices by which casualty insurers accomplish loss control objectives. While life insurers focus on moral hazard and selection effects, casualty insurers are also concerned with morale hazard and prevention effects. ►►

## While life insurers focus on moral hazard and selection effects, casualty insurers are also concerned with morale hazard and prevention effects.

► But there are types of operating risk that have gained attention lately, such as reputation risk, for which portfolio solutions are probably not efficient. Hence, much of the focus in this area is on developing robust processes to minimize the likelihood of “catastrophe” events. “Six Sigma” is the buzzword for those familiar with that concept.

### Looking to the Future

Where do actuaries fit into the new risk management profession? Currently, they are not in the picture. This is regrettable for two reasons. First, actuaries bring a lot to the table, especially in the difficult area of long-term risks that is the current focus of the new risk management professionals. Second, there is an enormous amount of dynamic energy and intellectual capital in play within the risk management profession, and actuaries can learn a lot from these talented professionals, and re-energize our own profession with new ideas, tools and techniques.

The risk managers I meet rely upon basic mathematical ideas and theories and think deeply and creatively from first principles. They work in partnership with regulators, such as governors or economists at the Federal Reserve Board, who are also accomplished and gifted individuals. Rather than focus on complying with complex and patchwork regulatory requirements—which actuaries can get tied up in—risk managers seem to take the lead on developing the new techniques that lead to more efficient regulatory solutions. Being a part of the bigger picture of the risk management profession might help our profession break out of its shell. The historical solution in the insurance industry for managing enterprise risk was building a complex regulatory structure and enforcing compliance, founded on the principle of conservatism. This was used as a substitute for quantitative measures of variability and more rigorous mathematical techniques. Actuaries have approached this system somewhat passively, often focusing their energies on managing to the regulatory rules rather than managing the underlying risk.



The new risk managers are action-oriented, creating dynamic market-based strategies to address some of the same risks actuaries work with every day. Many complain of the same problems actuaries face, that the managers they advise don't understand the theory and the numbers. But they seem to have the ear and the respect of their CEOs, based upon a history of success within the two short decades this “new” profession has been in existence. Their success and dynamism can serve as a useful inspiration for actuaries, as we seek to strengthen our profession and position it for an even brighter future. ●

*This article was originally published in the May 2004 issue of The Actuary.*



*Narayan Shankar, FSA, MAAA, is the SOA staff fellow for life practice. He can be reached at [nshankar@soa.org](mailto:nshankar@soa.org).*