SOCIETY OF ACTUARIES

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A New Perspective on Risk Management: Creating Value by Managing Risk

by Francis P. Sabatini and Joseph Weiss

What Is Risk Management?

Typically, risk management has been associated with interest rate risk, and the programs put into place to explicitly manage this risk have been fairly good. However, there is usually less emphasis placed on managing other risks inherent in the insurance industry. Industry risk management practices are not usually holistic, meaning risk is not viewed on a total company basis.

True enterprise risk management incorporates all company risk into a valuation and measurement system. These risks go beyond typical financial risks - interest rates, equity exposure, lapses, etc.—to risks such as market conduct exposure, operational risk, event risk, and even risks arising from changes in legislation. Unlike most other performance measurement programs within a company, risk management is a prospective measurement system. Typically, management looks at past results and/or current position, but risk management looks ahead, and deals not only with current issues, but also with issues yet to occur.

The financial services industry presently is a very dynamic industry, as it continues to go through a period of consolidation and convergence. Companies are finding it more difficult to compete in today's financial markets. Companies also have to fight harder to generate or maintain market share. Buyers today are more educated and savvy, and with a more astute marketplace, companies are seeing greater shareholder expectations. Risk management procedures can have a direct influence on company performance, and consequently a direct influence on stock price.

When implemented correctly, a successful risk management program is difficult to duplicate. One consistent feature of most successful programs is discipline. This includes infrastructure, frequent monitoring, solid information gathering, development of credible and actionable information providing management with a sound decision making framework. Quick decisions can then be made based on the information produced, enabling the company to take advantage of new opportunities.

Making the right choices within many areas of the company's business adds shareholder value. In addition to segment focus and product distribution, the company must determine its risk tolerance, decide to what extent it is prepared to handle risks, and finally, an appropriate capital and intellectual investment must be made to successfully implement the strategy. Making the right choices requires having the right information. Otherwise, success may be a result of being lucky, rather than being good, and it's hard to rely on consistent luck.

There are many drivers of value (e.g., earnings, volatility, public perception), and much of optimizing shareholder value deals with risk and the management of it. Value is a function of both the quality and volatility of earnings. The level of earnings is less meaningful on an absolute basis, but becomes more interesting when viewed relative to the risks assumed by the company. Along with tangible risk on the balance sheet, the company must also consider and respond to risks perceived by the marketplace. Value will then be optimized when the company is able to create the highest value for the risks assumed by the organization as a whole.

Old Paradigm vs. New Paradigm

There are two schools of thought concerning risk management techniques —The Old Paradigm (Risk Mitigation) and The New Paradigm (Capturing Opportunities).

Risk management has traditionally been viewed under the old paradigm as a defensive process, and is measured by the impact of these defensive measures. The ultimate goal of risk management is minimizing the negative effect of the risks to which the company is exposed. Risks are identified and assessed on a line-by-line basis, with no consideration given to interactions between lines. After risks have been identified and evaluated, a strategy is devised on a business line basis, with independent tolerances within each line. The strategies are then implemented, with the intent of mitigating existing risks within each line. The effectiveness of each plan of action is then monitored on a line-by-line basis, and the process repeats itself.

Under the new paradigm, risk management is viewed as a possibility to capture opportunities, using it as an offensive and differentiating weapon. If implemented properly, the risk/reward relationship is optimized, and the results are very difficult to replicate by competitors. In addition to the aggressive,

offensive approach of the new paradigm, another distinguishing feature is the broad scope of risk management strategy. Traditionally viewed separately for each business line, the new paradigm uses risk management on a total enterprise basis.

As with the old paradigm, the risk management process under the new paradigm begins by identifying risks, but as the risks are identified, so too are opportunities, optimizations and synergies across business lines. In other words, aggregating risks produces a holistic view rather than a line-by-line view. By aggregating risks, companies are able to take advantage of the fact that many of the risks in the financial services industry are not correlated. Once the risks and opportunities have been identified, they must be presented to management in a way such that management can determine a comfortable level of risk. And with the holistic view, management is usually a senior company officer rather than the head of a business line. Ordinarily, increased risk should produce a commensurate increased reward, and a plan is devised to optimize the risk/reward relationship on a total company basis.

Much of the analysis in developing this type of strategy requires extensive modeling capabilities, including appropriate hardware, software, modeling skills, and processes. Companies need to produce appropriate scenarios and use a suitable metric to measure results. Sensitivity and stress tests are required to determine the optimal strategy. The strategy is then implemented, with the goal to constantly improve the risk/reward tradeoff. The plan is constantly reevaluated and monitored to determine the effectiveness of the process, all the while considering dynamic changes in market conditions. Changes must be made rapidly to seize opportunities through real-time decisions. Institutionalizing the risk management process, that is, making it a full-time rather than a once-a year practice, is how best practice companies distinguish themselves from others.

Leveraging risk management as an opportunity rather than a defense mechanism is intended to add value, such as:

- Pursuit of a unique product opportunity based on the ability to recognize the risk/reward relationship
- Reduction of mitigation costs by tolerating risks which may be excessive for a specific business line, but are acceptable overall
- Growth without experiencing an increase in risk by taking advantage of natural hedges implicit across business lines

"The ultimate goal of risk management is minimizing the negative effect of the risks to which the company is exposed."

Case Study

The following case study will demonstrate the value of a financial risk management process. A comprehensive process including financial risk as well as business risk, operational risk and event risk will provide even greater benefit.

Suppose, in this simplified example, we have the following distribution of assets and liabilities:

LIABILITIES	
Universal Life	$400
Variable Annuities (with 5% roll-up GMDB)	$1,300
Bank CDs	$100

ASSETS
UL backed by Corporate bonds and mortgage pass-throughs
Bank CD backed by mortgage pass-throughs

In order to measure the risk of this company, the following three key elements are identified:

- Risk elements – Equity Markets risk, Interest Rate risk, Credit risk, Lapse risk and Mortality risk
- Risk measurement metric – Earnings at Risk (EaR™)
- Measurement horizon – 1, 5 and 10 years

A stochastic process will define each of the risk elements identified. Equity returns are stochastically generated on a correlated basis with interest rates. The interest rates are produced using a robust economic interest rate scenario generator. Credit risk is a fitted distribution based on historical default experience. In reality, there are periods with very little default experience, and there are rare occasions with substantial defaults. The distribution used reflects the frequency of these events. Lapses have a base lapse and dynamic lapse component. Lapses are a difficult component to specify, and could potentially be one of the more significant risks. Recent history has experienced a relatively low level of lapses, thanks in part to a low and declining interest rate environment. Should interest rates increase significantly, the actions of policyholders will be very difficult to predict. Mortality is distributed to simulate a long-term secular deterioration in mortality.

The Earnings at Risk (EaR) metric is one of many which could be used, and will be measured over a one, five and ten-year horizon. For each scenario the statutory book profits are summed over the horizon. The resulting scenario values are then ranked from lowest to highest. EaR is simply the difference between the mean value and the value at the 5th percentile. Other levels of EaR could also be used, such as the difference between the mean and the 10^{th} or 20^{th} percentile.

Table 1 presents the UL results using five-year earnings. The total column contains the results for the aggregate UL line, and the Lapse, Credit, Mortality and Interest columns include results isolated for each of the risk components. Using expected values for the other risk elements while credit processing is performed stochasticlly develops the

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credit risk-only result. A similar approach is used to isolate the contribution from each risk element (See Table 1 to the right).

Several observations can be made from the results.

- The Earnings at Risk is $8.4 (Mean of $9.7 less 5th percentile value of $1.3).
- The distribution of earnings is quite wide, going from a low value of negative $9.7 to a high value of $23.9.
- When looking at the individual risk elements, it is quickly apparent the sum of the individual risk components is greater than the total risk of the block of business. This outcome demonstrates the correlation effect between the different risk elements. The sum of the individual EaRs is $16.8, and the total EaR is $8.4, revealing a negative correlation of $8.4. What this illustrates is that the worst credit event does not necessarily occur at the same time as the worst interest rate event. And neither of those events occurs at the point in time of the worst mortality event. The different elements are not one 100% positively correlated, and, in fact, may be slightly negatively correlated.

Table 1 - UL Results (5-year Earnings)

Percentile	Total	Lapse	Credit	Mortality	Interest
1st	($9.7)	$16.6	$11.0	$7.6	($0.4)
5th	1.3	16.9	13.0	11.1	4.4
25th	7.2	17.1	14.4	14.9	10.3
50th	11.2	17.3	15.1	17.3	15.0
75th	14.9	17.4	15.8	18.7	18.0
100th	23.9	18.0	17.1	27.2	22.8
Mean	$9.7	$17.3	$14.7	$17.4	$12.9
EaR	8.4	0.4	1.7	6.2	8.5

When looking at these risk elements independently, they will produce a total amount of risk exposure that is greater than the aggregate result.

In addition to the correlation effect of the risk elements, there is also a correlation effect across different products. Since the risks are not all positively correlated, there is a natural benefit among the products. For example, when people lapse on variable annuities, they probably will persist with their UL policy or bank CD. Table 2 below includes the EaR for each product, as well as the correlation effect and the total company (holistic) results.

When taking a holistic view of the business, the interaction of the risk elements within the products, as well as the risk elements across the products is most evident. Summing the EaR for each product, and accounting for the risk element correlation effect produces a total EaR of $30.1. However, when including the total correlation effect across products, the EaR is reduced to $17.9.

The time horizon can also cause a substantial impact on the results of the analysis. The EaR for a one-year, 5-year and 10-year horizon for all products combined is included in Table 3 on page 19.

The total EaR does not change substantially over the different time horizons (3.9

Table 2 - Total Company Earnings at Risk

Risk Element	UL	VA	CD	Uncorrelated	Correlation Effect	Holistic
Interest	$8.5	$2.1	$1.2	$11.8	($0.4)	$11.4
Equity		21.3		21.3		21.3
Credit	1.7			1.7		1.7
Lapse	0.4	1.0		1.4	(0.2)	1.2
Mortality	6.2	0.3		6.6		6.7
Uncorrelated Total	16.8	24.7	1.2	42.7	(0.4)	42.3
Correlation Effect	(8.4)	(4.2)	(0.0)	(12.6)		(24.4)
Correlated Total	8.4	20.5	1.2	30.1		17.9

Table 3 - Earnings at Risk, Multiple Horizons

Risk Element	EaR[1]	EaR[5]	EaR[10]
Interest Rate	$1.1	$11.4	$27.4
Equity	5.9	21.3	50.4
Credit	0.9	1.7	1.9
Lapse	0.0	1.2	7.6
Mortality	1.3	6.7	14.7
Uncorrelated Total	9.1	42.3	102.1
Correlation Effect	(5.2)	(24.4)	(64.2)
Correlated Total	3.9	17.9	37.9

for one year, 3.6 per year for five year, and 3.8 per year for ten year), but the relative impact of the different risk elements has changed. For example, the interest rate risk is a much smaller percentage of the total on a one-year horizon than the five or ten-year horizon, and the equity exposure is a much greater percentage of the total for the one-year horizon.

Based on the product structures, the reasons for the patterns of the risk elements are intuitive. Interest rates are unlikely to have an immediate, short-term impact on the products, while equity markets have a significant probability of quick drops in value. Credit is more significant on a short-term basis, because while credit events are not common, they are quick and severe. Mortality maintains a consistent level of total risk for all horizons.

Now suppose the business mix is changed as follows:

- UL - $500 (formerly $400)
- Variable Annuities - $800 (formerly $1,300)
- Bank CDs - $500 (formerly $100)

Under the original business mix, the total correlated five-year EaR (from Table 2) was $17.9. Under the new business mix, the total correlated EaR is $17.3. At first, there does not appear to be a significant risk exposure difference between the original and new business mixes. However, Table 4 breaks down the EaRs on a percentile distribution basis.

The picture is quite different when viewing results over the entire range of outcomes. Clearly, the original mix with an emphasis on variable annuities is considerably more volatile. The old mix produces far lower earnings in the lower percentiles; even substantially negative earnings in the worst-case scenario, and earnings are not as high in the favorable scenarios. There is an obvious conclusion here. The more balanced product mix results in a significantly greater expected value without increasing the overall risk exposure. Arguably companies that have followed a more balanced product mix strategy have better valuations today because of the mix decisions.

Although this is a simplified example, the benefits of an integrated offensive approach to risk management are quite evident. Integrating other risks with the results from this type of analysis will produce a more effective process. This offensive use of risk management practices can be used strategically and tactically in setting investment strategies, product management tactics such as crediting strategies, product development decisions, etc. Making risk management a full-time practice, and taking an offensive rather than a defensive approach to risk management will put the company in a position to capture opportunities.

Table 4 - Earnings at Risk, Old Mix vs. New Mix

Percentile	Old Mix	New Mix
0th	($20.4)	$1.1
5th	7.7	17.4
25th	20.8	29.7
50th	28.7	36.9
75th	37.5	44.3
100th	46.5	51.8
Mean	25.6	34.7
EaR (Mean - 5th)	17.9	17.3

***Francis P. Sabatini, FSA, MAAA, is a partner at Ernst & Young LLP in Hartford, CT. He can be reached at* Frank.Sabatini@ey.com.**

***Joseph M. Weiss, FSA, MAAA, is a consulting actuary at Ernst & Young LLP in Hartford, CT. He can be reached at* Joseph.Weiss@ey.com.**

TREASURER'S REPORT 2001

FINANCIAL REPORTING SECTION
SOCIETY OF ACTUARIES
FINANCIAL STATEMENT
PERIOD ENDING SEPTEMBER 30, 2001

FUND BALANCE AS OF JANUARY 1, 2001 $380,726

	JUNE YTD	SEPTEMBER	SEPTEMBER YTD
INCOME:			
Dues	$36,240	$550	$36,790
Seminars	0	0	0
GAAP Book Sales	51,761	21,424	73,185
Newsletter	105	106	211
Monograph	60	0	60
Interest	6,106	3,166	9,272
Total Income	**$94,272**	**$25,246**	**$119,518**
EXPENSES:			
Travel	$968	$0	$968
Honorarium	5,000	0	5,000
Printing	4,335	2,475	6,810
Postage & Mailing	2,981	3,489	6,470
GAAP Book Expenses	21,874	12,938	34,812
Special Supplies	0	1,119	1,119
Functions	0	0	0
Conference Calls	58	91	149
Seminars	0	3,500	3,500
Research Projects	0	2,500	2,500
Course Development	0	8,750	8,750
Administrative Charge	18,560	0	18,560
Total Expenses	**$53,776**	**$34,862**	**$88,638**
Net Income	**$40,496**		**$30,880**
FUND BALANCE	**$421,222**	**----------**	**$411,606**

Notes to Financial Statement:
Printing: Newsletter - 9/01
Postage & Mailing: Newsletter - 6/01, 9/01
GAAP Book Expenses: Printing + Royalities
Special Supplies - elective transcription of two Toronto sessions+ retiring chair's gift
Conference Calls: 5/01, 7/01
Seminars: Section contribution to SOA international programs
Research: Section support of Futurism mortality project
Course Development: Section support of Wharton ALM Program

This Section has made the following financial commitments:
Distribution of expense monograph - up to $20,000
1995 Specialty Guides -$5,000 (to date - paid $2,020)
Wharton Program on ALM - $35,000 .(to date - paid $8,750)
Futurism Section Research on mortality at advanced ages $3,500 (to date - paid $2,500)