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The Coming Movement in Life Insurance Securitization

by Ed Betteto

This article has focused on motivation and trends rather than mechanics. Those interested in details are welcomed to contact the author.

The role of capital markets in the life insurance industry has been much discussed over the past few years. Insurance securitization efforts have to-date been primarily directed at catastrophe risk attracted by the margins of this low frequency/high severity business, particularly in the upper layers. An additional motivation for this attention was a perceived lack of capital to deal with a large catastrophe, with the attendant price increase that historically followed such an event.

Attention has now turned to insurance business characterized by large pools of small relatively homogenous

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Enterprise Risk And Capital Management

by Joan Lamm-Tennant, Ph.D.

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Efficient employment of capital throughout the insurance enterprise is a dilemma that most managers consider complex, yet critical to success. Capital efficiency suggests that operational and financial opportunities collectively result in maximum expected return, subject to the enterprise's risk tolerance. ERCM is an analytical framework for determining the efficient employment of capital across the enterprise while maintaining an appropriate balance between the insurer's risk appetite and its desire to earn attractive returns for its policyholders, shareholders or club members. ERCM is built upon a foundational premise that each component of capital is related and must be considered in the context of an overall portfolio of the insurer's capital management initiatives. That is, operational and financial opportunities in essence become a "portfolio" of choices whereby the effectiveness of any one choice is dependent upon the alternative choices. For example, appropriate asset allocation is dependent upon the business mix, leverage position, dividend policy and reinsurance strategy. Likewise, the appropriate reinsurance strategy is related not only to the business mix but also to the asset allocation choice, leverage position, and dividend policy.

When allocating capital to achieve optimal financial/operational results, managers must identify the metric for evaluating success: accounting or economic. For example, some companies monitor success in terms of GAAP return on equity or growth in GAAP surplus, while other insurers consider economic measures such as shareholder-

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LOMA Collaborates on New Reinsurance Designation

by Edward T. Burns & Jennifer W. Herrod

As reinsurance has become critical in managing the bottom line, insurance companies need educational tools to help them better understand reinsurance processes and procedures. LOMA, in conjunction with LOMA's Reinsurance Administration Professionals Committee (RAPC), has developed a unique program to fill that need.

Not only do many hands make light work, many industry specialists also enhance LOMA's ability to create high-quality materials for professional education and development. Recent collaboration between LOMA and a newly formed industry committee has functioned well to guide the development of two unique products designed to offer the whole industry a better understanding of the inner workings of reinsurance-insurance that transfers risk from one insurer to another.

The first of these products is a new StepOne text entitled *Intro to Reinsurance*, which is designed to introduce the basic concepts of reinsurance. The second product, *Reinsurance Administration*, is a full-length textbook to be used as the basis for the cornerstone course in a new associate-level program leading to the professional designation, Associate, Reinsurance Administration (ARA). Students can earn the ARA by completing six LOMA courses (see page 15). e concerns, problems, and solutions.

The Growth of an Industry Initiative

The new reinsurance education products became possible through a concerted industry effort begun years ago by the ives representing many prominent rein-

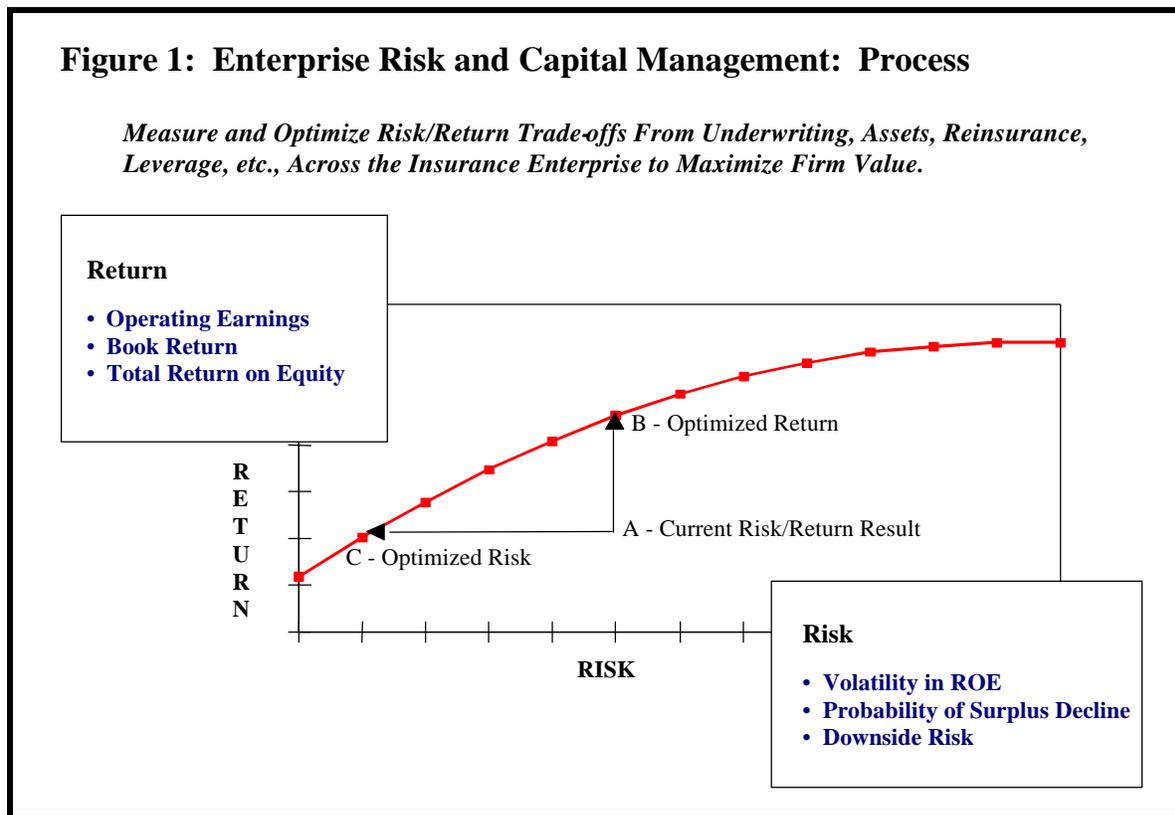
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wealth or total rate of return. An analytical framework supporting the efficient employment of capital must be mindful of these alternative success measures and must customize the objective function when optimizing decisions to recognize the appropriate success metric. Furthermore, since decisionmakers are encumbered by regulation, rating agencies and taxation, ERCM allows for the recognition of operational and financial constraints. This ensures that the recommended decision is capable of being transacted.

Why Manage Risk at the Enterprise Level?

By managing risk at the enterprise level, one may take full advantage of all internal diversification opportunities. The firm achieves greater efficiencies by optimizing the total organization, as opposed to optimizing the parts. Likewise, firm value is increased through enterprise risk management for

three reasons: (1) firms can avoid costly investment decision errors such as the classic problem of underinvesting or passing up opportunities with positive net present values; (2) firms can decrease taxes; and (3) firms decrease costs associated with encountering financial distress and monitoring the conflicts between agents (shareholders, rating agencies, security analysts, policyholders, and employees).

Enterprise Risk and Capital Management—Process

Optimization routines not only manage financial risk but also allow for maximization of the firm's success drivers and ultimately its value within the constraints of risk tolerance and other internal/external limitations. One way of illustrating this concept is to refer to the efficient frontier as depicted in Figure 1. Although the concept may be familiar, it is not to be confused with the asset-only efficient frontier. We recognize the com-

plete enterprise and, therefore, have considered the risks associated with both sides of the balance sheet. Point A benchmarks the firm's current operational/financial decision set (product mix, asset allocation, reinsurance choice, leverage policy, dividend policy) in a risk/return paradigm. By optimizing the various operational/financial decisions while recognizing the interrelationships, efficient decision sets (illustrated as points B and C) are identified. At point B, the firm's expected measure of success is improved without increasing risk. Alternatively, at point C, enterprise risk is reduced without effecting the success measure.

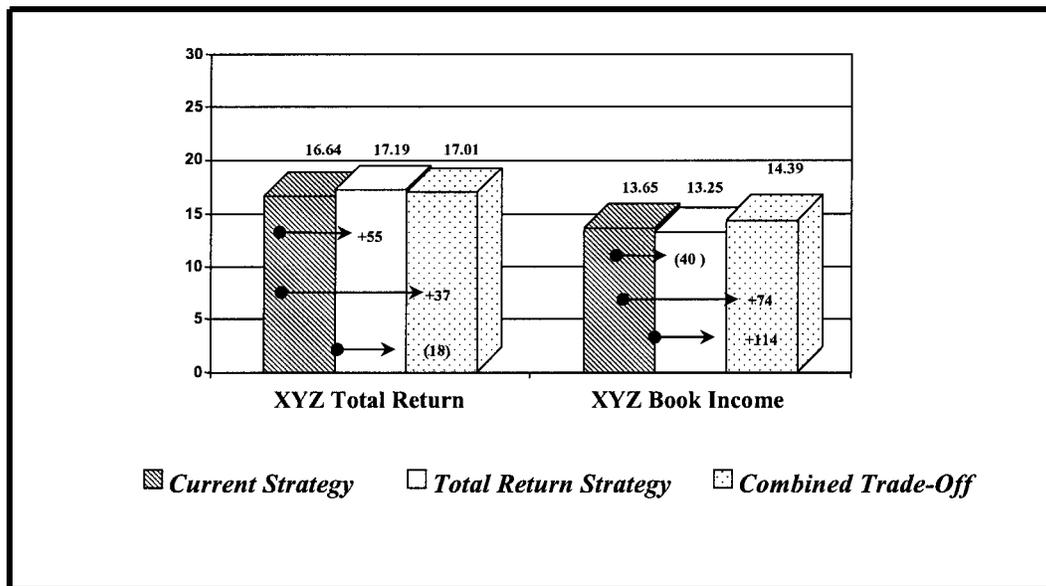
The efficient sets, underlying Points B and C, are reflective of a business process that maximizes the impact of operational and financial decisions on the enterprise's success drivers, while constraining for risk as well as other internal/external constraints. Financial economic theory becomes the foundation

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Figure 2: Managing the Divergence: Total Return vs. Book Income



for these optimization routines, while systems and technology become the engine, allowing management to gain insights from detailed and interrelated company data.

Evaluating the effectiveness of a capital management strategy in a risk/return framework is complicated since decisionmakers tend to manage towards numerous success drivers. In addition, risk has numerous metrics. Using alternative measures of success as the objective function (aftertax total return on equity, book income, growth in premiums) and alternative measures of risk (volatility, downside risk, value at risk), managers can more fully appreciate the various risk and return profiles relative to their business. Furthermore, managers gain insights into the various conflicts such as managing towards economic value versus GAAP or statutory value. These conflicts exist because we have numerous agents in our business (rating agencies, regulatory authorities, tax, security analysts, shareholders), each with differing perceptions of return and

risk. Ultimately, decisionmakers manage the divergence between the various conflicts in their business. Identifying the conflicts, and the resulting costs attributed to these conflicts, supports the ultimate resolution.

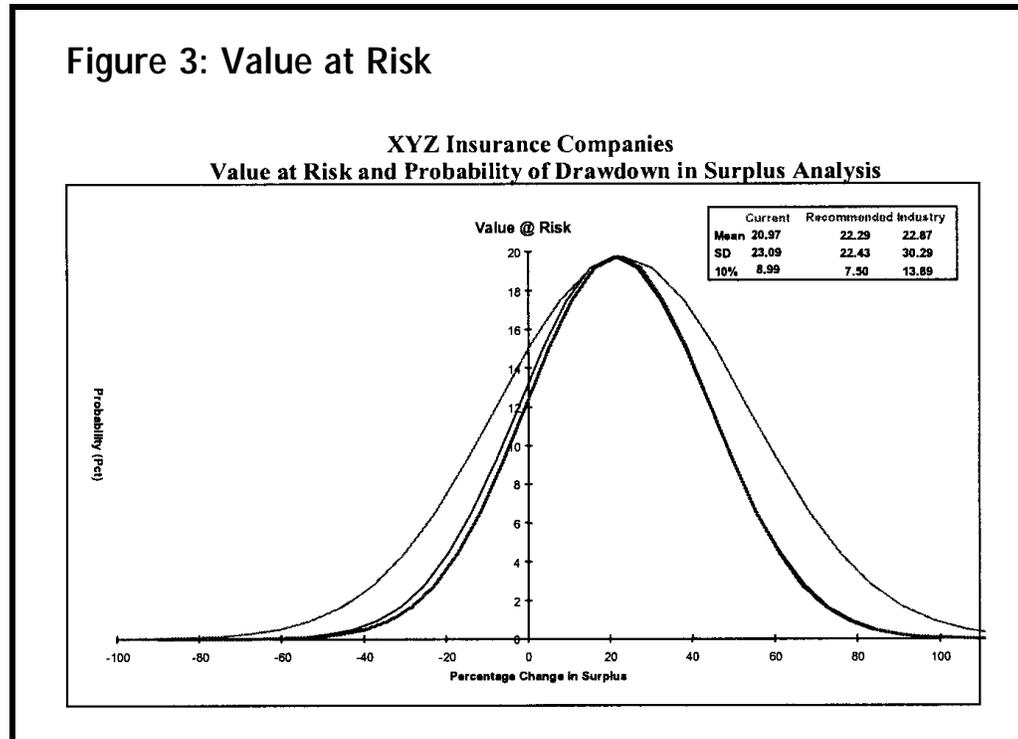
Figure 2 illustrates the tradeoffs between ERCM routines targeting optimal economic value versus optimal accounting value. Given the insurer's current set of capital decisions (business mix, asset allocation, reinsurance and leverage), the insurer's expected economic total return is 16.64% with a GAAP return on equity (book income) of 13.65%. Capital allocation choices are structured to optimize economic total return while achieving a target of 17.19% (an increase of 55 basis points relative to the current target). Nevertheless, this capital allocation choice reduces GAAP return on equity (book income) by 40 basis points. If the decisionmaker considers book income and total return as equivalent units, this would be an acceptable position. Given the attention placed on book income by

regulators, rating analysts and security analysts, a decision-maker most likely values a unit of book income more than a unit of total return. Consequently, a combined objective function targeting economic total return with a constraint on book income growth may be preferred. The capital allocation choice resulting from the combined objective function increases economic total return relative to the current strategy (although it is suboptimal relative to the total return strategy). Nevertheless the capital allocation strategy, resulting from the combined objective function, drives book income to 14.39% (an increase relative to the current decision set of 74 basis points).

Two methodologies may be employed in deriving optimal operational/financial decision sets: MeanVariance Method and Stochastic Financial Statement Method.

The MeanVariance Method employs some simplifying assumptions. One of these assumptions suggests that the distribution of asset returns and losses can

Figure 3: Value at Risk



be captured with reasonable accuracy using the mean and variance. Although this assumption can be overly restrictive, the MeanVariance Method is conceptually eloquent allowing for ease in interrelating numerous confounding variables.

When attention to accuracy is paramount, as opposed to conceptual simplicity, the Stochastic Financial Statement Method is more appropriate. The advantage of Stochastic Financial Statement Method is its ability to capture the true underlying distributions of the assets, liabilities and its ability to model assets and liabilities at detailed levels.

Business Decisions Supported by Enterprise Risk and Capital Management

ERCM provides analytical support to the following operational and financial decisions:

1. What is the insurer's overall enterprise risk exposure measured in terms of "value at risk" or "probability of surplus decline?" How does this level of enterprise risk compare to peer companies?
2. What is the appropriate risk level and underlying optimal asset

allocation policy relative to liabilities?

3. Given that capital is limited, which insurance markets should be targeted for growth while recognizing the economic interrelationships between the lines of business mix? How should capital be allocated across lines of business?
4. Which reinsurance structure(s) is appropriate from an economic perspective versus an accounting perspective?
5. When considering merger/acquisitions, what is the economic value of the target company relative to the acquirer's portfolio of assets and liabilities?
6. Which constraints (internal and external) affect the employment of capital and what are the economic costs of these constraints?

Value at Risk

ERCM derives a value at risk in terms of a probability of surplus decline. The distribution of potential percentage changes in surplus is derived using the Stochastic Financial Statement Method. Although alternative percentages can be derived, for the purpose of this example, value at risk is measured as the probability of a

10% surplus decline. Using a nonlinear stochastic process, the distribution of each liability and each asset is modeled capturing the expected return, variance and covariances. For each path a financial statement is derived, resulting in a change in surplus from the beginning balance sheet. This distribution of percentage change in surplus across paths becomes a measure of downside risk: the fear of loss, as opposed to the fear of uncertainty.

Figure 3 illustrates the distribution of a percentage change in surplus for the XYZ Insurance Company given its current set of operational/financial decisions, versus an optimal (recommended) set of operational/financial decisions. In addition, the industry parameters are model for comparative purposes. To derive the probability of a 10% decline or more in surplus, the area under the distribution curve and to the left of 10%, is calculated. The current operational/financial decisions result in an 8.99% chance of a 10% surplus decline. The recommended decision set reduces the value at risk to a 7.50% chance of a 10% surplus decline. For benchmarking purposes, the current and recommended decision set results in a value at risk

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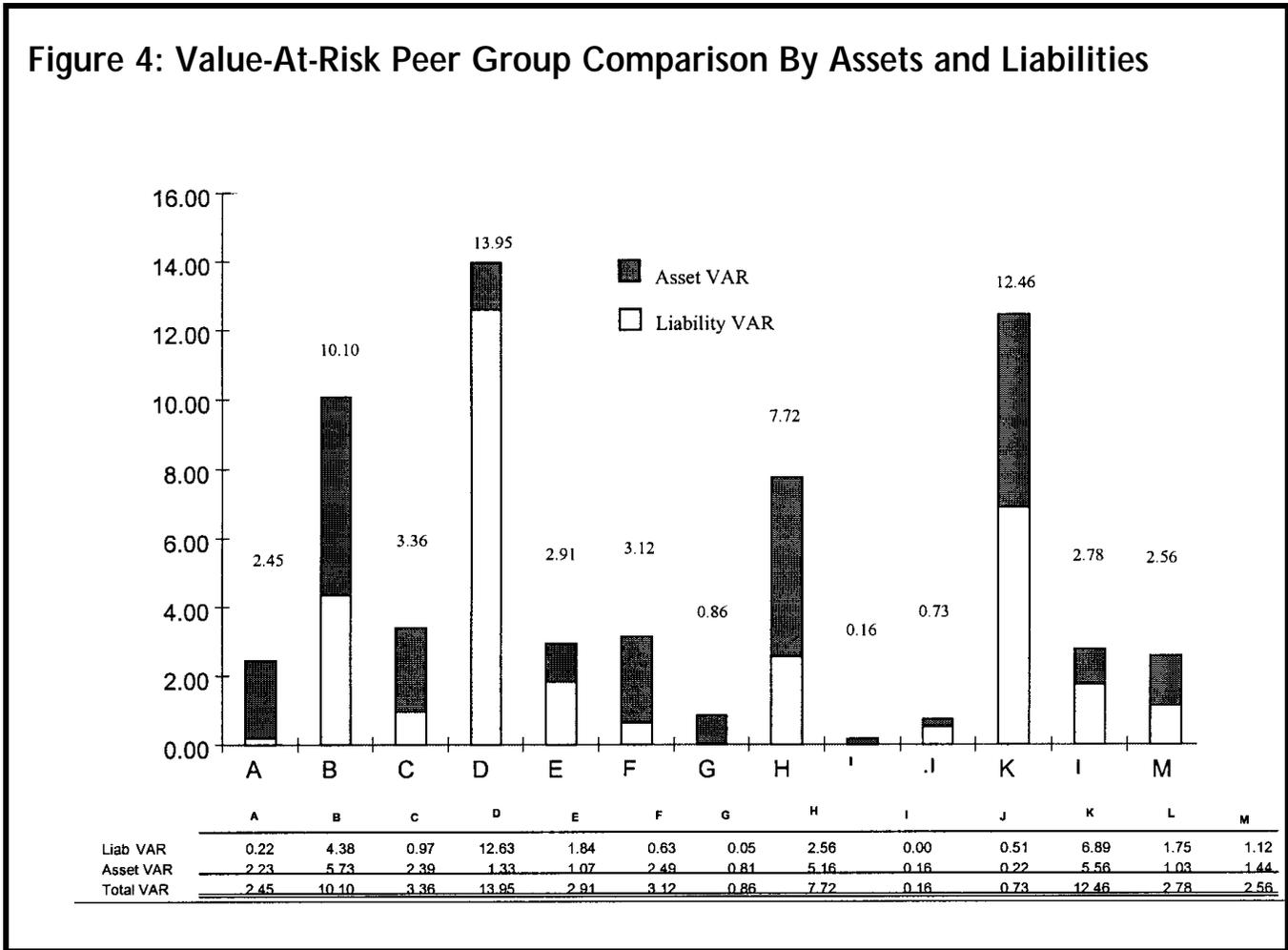


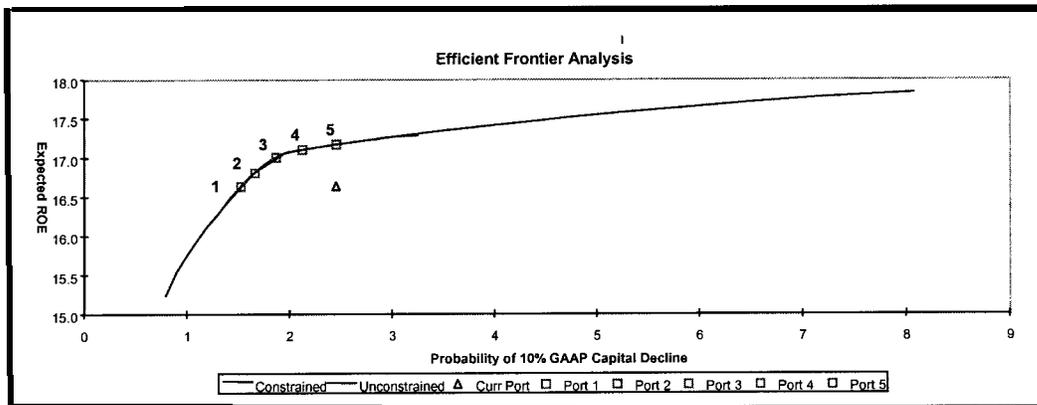
Figure 4 illustrates the value at risk (probability of a 10% or more declines in surplus) for Company A relative to individual companies specified as peer companies. Company A has a moderate value at risk relative to its peers. Furthermore, Company A's value at risk is largely driven by the risk embedded in assets as opposed to underwriting. The reverse is true for Company D.

Appropriate Level of Risk

The prior example benchmarked the risk level but was not explicit in terms of the appropriateness of the level. One approach to delineating an appropriated level of risk is to derive the point of diminishing marginal returns. That is, the level of risk whereby incremental increases in risk result in additional expected return although at a diminish-

ing rate. At some point it becomes senseless to continue traveling up the efficient frontier. In fact, eventually the efficient frontier flattens so that incremental increases in risk taking behavior results in no additional expected return. Referencing Figure 5, reward for risk taking begins to diminish beyond Portfolio 2.

Figure 5: How Much Risk Should We Take?



Prospective Returns - GAAP Risk Optimization						
	Current Portfolio	Portfolio 1	Portfolio 2	Portfolio 3	Portfolio 4	Portfolio 5
Expected Return	16.64	16.64	16.81	17.01	17.10	17.17
Std Dev of Exp Rtn	13.54	12.32	12.60	12.98	13.36	13.81
Probability of 10% Decline	2.46	1.53	1.67	1.87	2.13	2.46
Book Income	13.65	14.56	14.48	14.39	14.27	14.02
Addl Return			0.17	0.20	0.09	0.07
Addl Risk			0.14	0.20	0.26	0.33
Addl Return/Addl Risk			1.21	1.00	0.35	0.21

less than the industry. An alternative benchmark population could be companies of similar A.M. Best's ratings or companies with similar characteristics (size, line of business structure, ownership structure.)

Capital Allocation

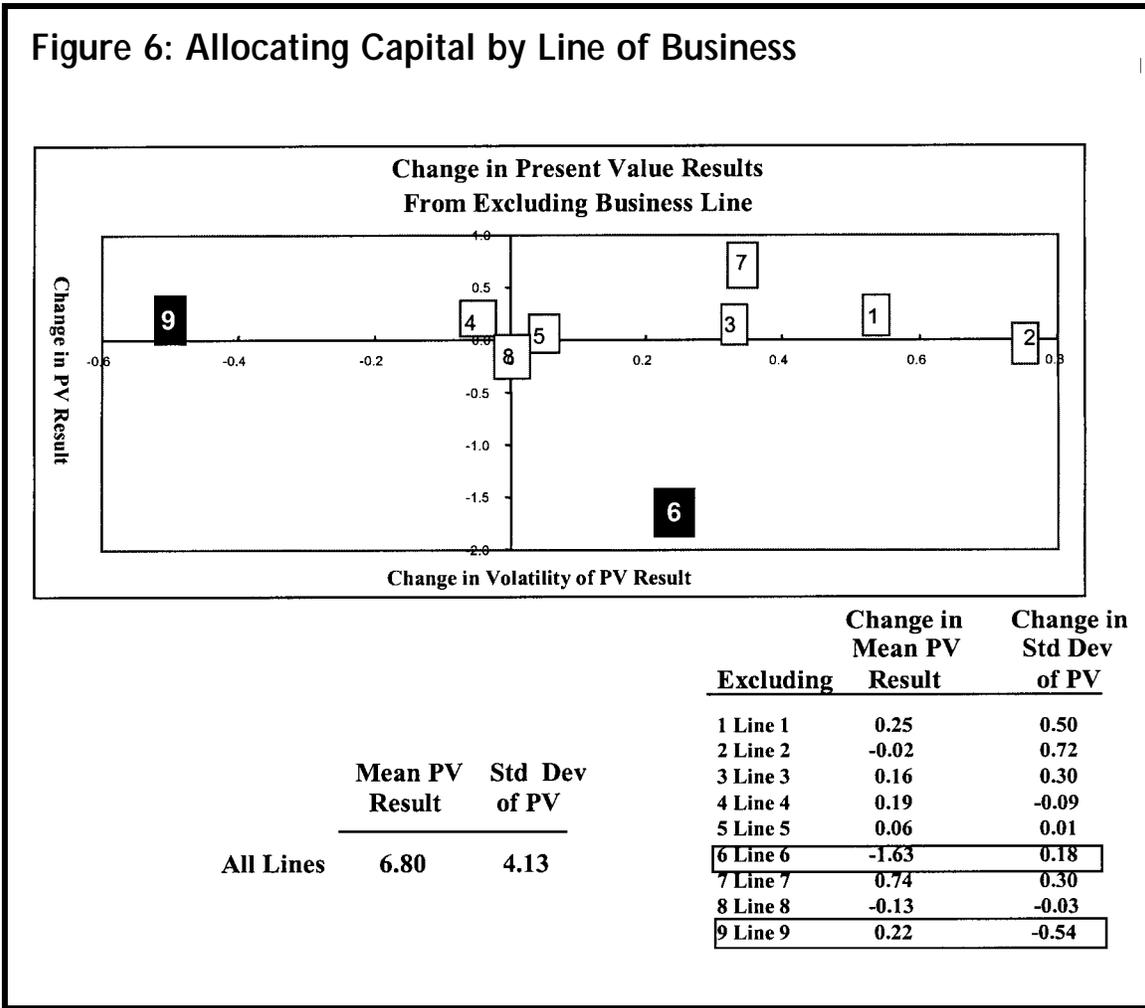
Given that capital is limited, operating entities and ultimately the lines within the operating entities should be capitalized on a risk adjusted basis. That is, a line of business should be capitalized based upon the risk it adds to the enterprise, as opposed to its "stand alone" risk. Considering the expected return and risk characteristics of each line of business independently of the other lines

may be problematic. The riskiness of the line (and ultimately the basis for allocating capital on a risk adjusted basis) must be respecified as the risk the line carries into the portfolio of other lines of business given the alternative financial decisions such as leverage and asset allocation. Allocation of capital on a risk adjusted basis (whereby risk is specified as the "nondiversifiable" component of total risk) is contingent upon modeling enterprise risk, as well as enterprise return.

Likewise, when targeting lines for growth, the decisionmaker must consider the "relative" attractiveness of the line on an enterprise risk adjusted basis. Figure 6 illustrates the effect on the present value

of cash flows (inclusive of assets and liabilities) and on the volatility of the present value of cash flows across stochastic paths, when a line is excluded from the portfolio. For example, if line 9 is excluded from the firm's portfolio of assets and liabilities, the present value of profits is increased by 0.22 and the volatility in the present value of cash flows is decreased by 0.54. Hence line 9 would be targeted for sale or perhaps runoff. Alternatively, if line 9 is critical to allow entrance into line 6, then line 9 may be reinsured. Line 6 is quite attractive; elimination of line 6 from the portfolio would not only decrease the present value of cash flows but would also increase volatility.

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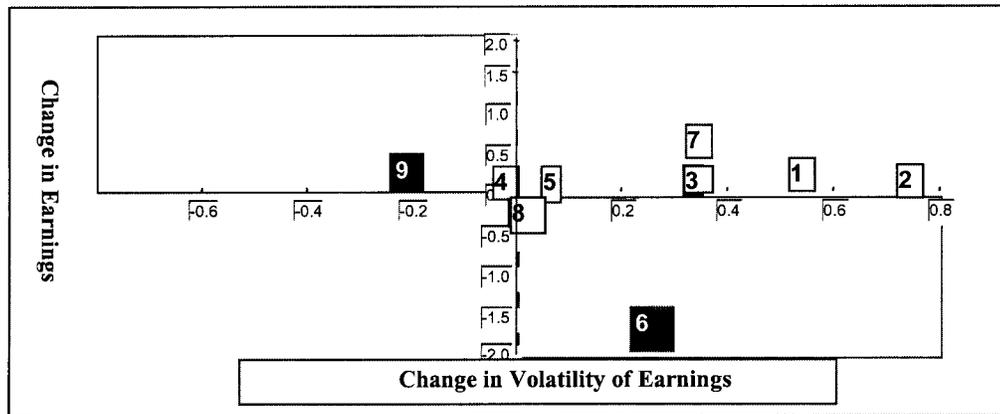
Reinsurance Analysis

An appropriate reinsurance structure follows from the previous analysis. For example, assume that line 9 is reinsured, the enterprise's present value of cash flows will decline as well as enterprise risk. Referencing Figure 7, economic enterprise value declines 7 units, whereas enterprise risk declines 14 units due to reinsuring line 9. Having reinsured line 9 might be well justified since the decrease

in enterprise cash flow volatility (even though this decrease may be less than that of the line) releases units of enterprise risk. These units of enterprise risk released through the reinsurance decision may be subsequently spent in the asset markets by reallocating assets to allow for additional units of interest rate risk, reinvestment rate risk or credit risk. If the reward to risk taking behavior in the asset markets is greater than the cost for laying off risk in the liability markets via

reinsurance, then the reinsurance choice is economically intuitive. In essence, the decisionmaker swaps risk units across the balance sheet so as to optimize the portfolio of risk units. The decision is indifferent where the risk units originate so long as the resulting portfolio yields maximum expected return net transaction costs. Reinsurance releases risk exposures on the liability side of the balance sheet. Similarly, an asset hedge strategy will release risk exposures on the asset

Figure 7: Integrating Reinsurance



	Mean Earnings	Std Dev of Earnings	Change in Excluding Earnings	Change in Std Dev of Earnings
No Reinsurance	6.80	4.13		
With Reinsurance	6.73	3.99		
	-0.07	-0.14		
			1 Line 1	0.25 0.50
			2 Line 2	-0.02 0.72
			3 Line 3	0.16 0.30
			4 Line 4	0.19 -0.09
			5 Line 5	0.06 0.01
			6 Line 6	-1.63 0.18
			7 Line 7	0.74 0.30
			8 Line 8	-0.13 -0.03
			9 Line 9	0.31 -0.21

side of the balance sheet.

Merger and Acquisition Analysis

The economic value of an acquisition or merger may not be determined unless the interrelationships between the targeted and acquiring firms are explicitly recog-

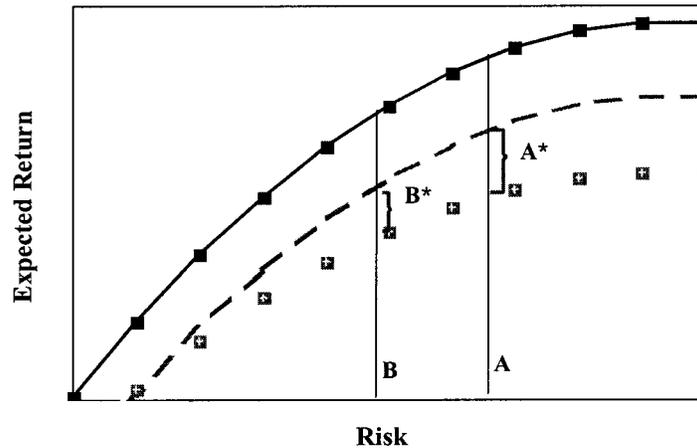
nized. Furthermore, the economic value of the acquisition or merger is dependent upon the risk propensity post acquisition. Figure 8 illustrates the enterprise efficient frontier for the acquiring firm and the targeted firm, as well as for the combined firm's efficient frontier. Note that

the economic value of the acquisition is dependent upon the post-acquisition risk tolerance. If the risk tolerance is A, then the economic value and ultimately the efficient price for the acquisition is A*. Likewise, the efficient price is B* if the risk tolerance is B.

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Figure 8: Merger and Acquisition Analysis



Cost of Constraints

As constraints are imposed (external or internal), the new constrained efficient frontier lies inside of the unconstrained efficient frontier. Hence, the opportunity cost of the constraint becomes observable. For any level of risk tolerance some expected return will be foregone. The

may be evaluated. Some constraints appear important, yet are not binding. These constraints have little or no effect on the ultimate decision set, yet they may impose an opportunity cost.

Summary and Conclusion

Managers of insurance companies are entrusted with capital, however, with the

laying off risk. ERCM provides a framework, supported by analytics, to assist managers when rendering optimal operational/financial decisions. These decisions may be optimized as a portfolio of choices.

Joan Lamm-Tennant wishes to thank her colleagues—Peter Minton, Brian McKernan, Teresa McTague, Rich Olsen, Joe Wallen and Kevin Werle—in the Enterprise Risk and Capital Management Practice at General Re and General Re New England Asset Management, for their contributions to this article.

“ERCM provides a framework, supported by analytics, to assist managers when rendering optimal/financial decisions. These decisions may be optimized as a portfolio of choices.”

decisionmaker may introduce the constraints sequentially, observing the cost of each constraint. Also, the effect of the constraint on the ultimate decision set

caueat that it will be used for maximizing enterprise value. Over time they face many capital management decisions that present opportunities for taking on or