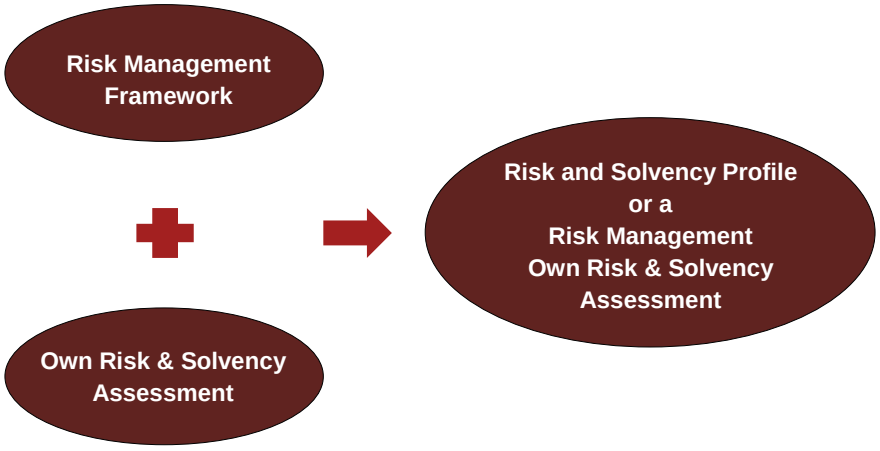
Using a Risk Management Own Risk and Solvency Assessment to Improve Risk to Reward Decision-making

Using a RMORSA to Improve Risk and Reward Decision-making

The NAIC's adoption of the Risk Management and Own Risk and Solvency Assessment (RMORSA) has immediate implications for U.S. insurers' enterprise risk management (ERM) functions. Now is the time for insurers to begin assessing how this landmark legislation will affect their ERM functions and the value they can gain by integrating its requirements into how they manage their businesses.

We begin by noting that risk management frameworks and RMORSAs are intimately related: a risk management framework formally describes the people, functions, processes, and activities that insurance companies use to manage risk on an enterprise-wide basis, while a RMORSA describes the resulting implications of that framework. In other words, a risk management framework describes what an insurance company is going to do to identify and manage their risks, while a RMORSA assesses the resulting implications of the activities the company undertakes to manage risks. Taken together, a risk management framework (which includes risk appetite documents and any related risk policies) and a RMORSA portray an insurer's Risk and Solvency Profile.



One way of preparing a RMORSA is by comparing "normal" business analyses and metrics with stressed ones. Much of insurance ERM's current focus is on scenarios and stress tests, and while we also will comment on them later in this document, it is important to first understand the significance of normal state (or business as usual) analyses.

Normal state analysis

At the present time, insurers have placed a great deal of attention on insurance measures and metrics from both the liability-side (e.g., predictive pricing models, retention models, catastrophe models [e.g., hurricanes, earthquakes, pandemics, etc.]) and the asset-side (e.g., Sharpe Ratios, Value-at-Risk, etc.). Accordingly, many RMORSAs are likely to extensively profile analytics. However, the risks underlying, or attaching to, such analytics are currently receiving relatively little attention.

For example, data quality is a longstanding issue throughout the financial services sector and one that has a direct bearing on analytical effectiveness.[1] To explain, many financial services firms expend significant effort transforming source system data into usable management data. However, there is little guidance on how a RMORSA should address data-related risks, including how an independent reviewer will validate the data that is used to prepare a RMORSA. One possible solution is to have internal audit extract data from source systems and then follow the procedures for scrubbing the data to arrive at the modelled set. An alternative is for regulators or external advisors to undertake data validation. Whichever form RMORSA data validation

ultimately takes, it will likely play a significant role in determining the acceptance/rejection of RMORSA information.

The form analytics take also poses certain risks. For example, insurers currently prepare many analytics on a net (of reinsurance and hedging) basis. However, a lesson of the recent financial crisis is that both gross *and* net exposures should be subjected to analysis, not just nets. The reason for this is straightforward: "There could be net-related concentrations within overall exposures that could put a full recovery at risk during times of distress. In other words, during an extreme event an actual recovery could wind up being less than 100 cents on the dollar and therefore could exacerbate a concentrated loss."[2]

Another risk that analytics pose arises from the *assumptions* upon which they are based; specifically, do modelled assumptions accurately represent the fundamentals of the business or exposures being modelled? Risk models in general were the target of significant criticism following the recent financial crisis,[3] but in many ways that criticism was misplaced. A model is a simplification of reality, which means models necessarily contain some level of error.

To minimize such error, insurers can directly base modelled assumptions on business or exposure fundamentals in contrast to simple data fitting. The bestselling book *Moneyball* illustrated this point; for example, in that book, sabermetrics pioneer Bill James is quoted as follows:

- I do not start with the numbers any more than a mechanic starts with a monkey wrench. I start with the game [of baseball], with the things that I see there and the things people say there. And I ask: Is it true? Can you validate it? Can you measure it? How does it fit with the rest of the machinery?[4]

A further risk posed by analytics arises from how companies select measures and metrics to track and present them; specifically, are measures and metrics chosen to accurately portray business consequences or to validate a specific point-of-view? Humans have a well known psychological bias that favors information which supports current beliefs.[5] A RMORSA-related example of this bias is analytics that reflect adequate solvency to some multi-millennium return period.[6] Clearly, the information such measures relay is limited. What's more, the risks of basing RMORSA analyses on such measures seem significant. For example, consider a regulator's likely response if such measures, based on very remote likelihoods, turn out to be wrong. One currently popular way to manage such risks is through the use of stress (including reverse stress) tests and scenarios.

Stress tests and scenarios

A stress test is a way to understand significant analytical changes due to changes in one (or two) key variables. While stress testing can be enlightening, it is heavily assumptions-dependent and often based on limited historical data. Therefore, if the variables chosen for analysis are not adequately stressed, due either to limited historical data or to rigidly-conservative estimations of stressed parameters, then the results will be of limited – if any – use. Because we all have a limited understanding of outlying or extreme events, the reasons for not robustly stressing a risk are not necessarily nefarious.[7] Significantly, there are ways to control the risks of this limitation.

One way of addressing limited current state understanding is through the use of scenario analysis. There are two general forms of scenario analysis. The first form is based on discrete "realistic disaster scenarios," which are hypothetical extreme events that are created based on "realistic" assumptions that insurers can accumulate against. This form of scenario analysis is very popular (e.g., Lloyd's Realistic Disaster Scenarios),[8] and it can provide insights when the scenarios are prepared and analyzed properly. However, this form of analysis is limited because, for instance, it treats exposure interactions statically. The static orientation also means the scenarios are not forward-looking and thus their predictive value is very low, which limits their use in strategic activities like business planning.

One way to address the limitations of static "realistic disaster scenarios" is through the use of strategic scenario analysis. Rather than starting with hypothetical extreme events, "strategic scenarios" start with firm-specific risks and then identify key uncertainties and trends of those risks upon which narrative scenarios are derived. These scenarios then can be accumulated against, tracked and managed to. According to two leading strategy researchers, this form of analysis creates scenarios that "are descriptive narratives of plausible alternative projections of a specific part of the future. They are methodically researched and developed in sets of three, four, or more to study how an organization, or one of its decisions, would fare in each future in the set.... [In short,] the scenarios are projections of a potential future."[9] Because scenarios like this are constructed on an insurer-specific basis, they can provide important milestones that can be tracked to determine if a "potential future" is developing, and if so, how an insurer is responding to it.

Perhaps more importantly, strategic scenarios can begin the assessment of exposure interactions that many models frequently do not include. For example, perhaps no two risks are more intensely modelled in the insurance industry than credit and catastrophes (e.g., natural catastrophes in P&C and pandemic in life and health). And yet, most insurers currently do not model the credit risk associated with a major catastrophe. Some may feel that a simple work-around to this situation is to add a 99% credit VaR to a 1-in-100 probable maximum catastrophe loss, but that is obviously not correct as the two measures are based on different assumptions that do not consider interactive effects. Because this is related to our above gross and net discussion, consider the following:

- If a counterparty fails, what started out as a net position for a particular [financial institution] instantaneously becomes a gross position, because the "hedge" [or reinsurance] disappeared. Fundamentally, the risk is in the gross position, not the net. When gross positions increase by 500%, the theoretical risk increases by 5,000% or more because of the exponential relationship between scale and catastrophic event size.[10]

Insurers can use formal techniques such as "system dynamics" (which is a technique to model feedback loops and time delays) and "agent-based modelling" (which is a technique to model the actions and interactions of independent agents) to analyze broad-based sources of risk like the combined effects of catastrophe and credit exposures, etc.[11] Simulated results can be produced from these models that insurers can use to actively inform and enhance risk-to-reward decision-making, which is a fundamental RMORSA objective.

Uses and conclusion

A RMORSA is not simply another insurance filing, and therefore insurers should not view it as such. For example, for a regulator to accept a RMORSA, a formal linkage between that document and business planning processes must be apparent. As a result, a great deal of material has been written on various "use tests," but we feel that much of it falls short of the full benefits that can be achieved. To explain, consider the topics we address in this short paper and how they can enhance the risk-to-reward aspects of insurance business planning:

Current State	RMORSA-Inspired Improvements
Questionable data quality.	Independently validated data.
Predominantly net-based analytics.	Gross *and* net-based analytics.
Analytics heavily rely on data fit-based assumptions.	Model assumptions are based on historical experience *and* business fundamentals.
"Confirmation bias risk" of analytics selection: • Use stress testing, reverse stress testing and "realistic disaster scenarios" to mitigate this bias.	"Confirmation bias risk" of analytics selection: • Develop strategic scenarios to gain a greater level of understanding of the risks surrounding potential alternative futures *and* how the company will manage the risks of those futures.

Current State	RMORSA-Inspired Improvements
	• Use system dynamics and agent-based modeling to discern key risks interactions and potentially significant feedback effects.

As we describe above, insurers can leverage RMORSA-inspired improvements to significantly improve risk-to-reward decision-making in general and insurance business planning in particular, both over a one-year and a longer time horizon. Therefore, insurers that seize this opportunity to design or re-design their risk management functions and processes not only will promote effective regulatory relations, but also help position their companies to better navigate the uncertainty of the current, difficult market environments, as well as during the future volatile events that we all know are waiting for us somewhere, at some time in the future.

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Endnotes

[1] A number of insurance CIOs are working diligently on data-related issues under the belief that insurers with the best data in the next decade will be the most profitable, and have the most favorable Risk and Solvency Profiles.

[2] Joseph Calandro, Jr., Paul Delbridge and Mark Purowitz, *Strategic risk management: Facilitating risk-based insurance decisions*, PwC white paper, March 2012, p. 5. See also James Rickards, *Currency Wars* (NY: Portfolio Penguin, 2011), p. 210.

[3] See, for example, Felix Salmon, "Recipe for Disaster: The Formula That Killed Wall Street," *Wired*, February 23, 2009, **http://www.wired.com/techbiz/it/magazine/17-03/wp_quant?currentPage=all**

[4] Michael Lewis, *Moneyball* (NY: Norton, 2003), p. 75.

[5] Formally known as "confirmation bias." For more information see Edward Russo and Paul Schoemaker, *Winning Decisions* (NY: Currency, 2002), pp. 84-85.

[6] An example is the 99.99% confidence level that some firms target for economic capital purposes.

[7] For more information see Daniel Kahneman, *Thinking Fast and Slow* (NY: FSG, 2011), Ch. 4, which is titled "The Illusion of Understanding."

[8] Lloyd's of London, *Realistic disaster scenarios - Scenario specification*, January 2012, **http://www.lloyds.com/~/media/Files/The%20Market/Tools%20and%20resources/Exposure%20management/RDS%20%20Scenario%20Specification%20%20January%202012.pdf**

[9] Liam Fahey and Robert Randall Eds.*, Learning from the Future* (NY: Wiley, 1998), pp. 6-7.

[10] Rickards (2011), p. 210.

[11] For more information see the seminal article by John Sterman, " System Dynamics Modelling: Tools For Learning in a Complex World,*" California Management Review,* Vol. 43, No. 4, Summer (2001), pp. 8 - 25. Note also Robert Axelrod and Michael Cohen*, Harnessing Complexity* (NY: Basic Books, 2000).

To have a deeper discussion about using an ORSA to improve risk and reward decision-making, please contact:

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