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Sailing and Insurance Risk Management Are One and the Same

By David Schraub

WHAT SAILING IS ALL ABOUT

The Vendee Globe is an awesome adventure with great sailors, hefty risks and a finish line many weeks later. This race around the globe is without stop or external help. The sailor is alone with his/her boat for months and is exposed to all the elements. Michel Desjoyeaux won the 2008/2009 race, with a time of 84 days, 3 hours, 9 minutes and 8 seconds, at an average speed of 12.3 knots on the theoretical route and 14 knots over the 28,303 miles actually covered on the water. The last of the sailors finished the race 42 days later while 18 competitors retired.

Many followers focus on the race itself and how to get the boat going faster and faster. Student sailors¹ are thrilled about the way one can push the boat, fine tune the sail positions to maximize speed, all while preventing mechanical breakdown. They also know how to time a turn to avoid rocks and other direct threats. More advanced players know about tides,² currents, seasonal weather and other elements that impact floatability. Very few know anything about aerodynamics, hydrodynamics and other mechanical resistance theories that come into play when designing the shape of a boat. Without second-guessing engineers, top sailors need to have: (1) a working

knowledge of these mechanical fluid theories to be able to understand where the breaking point is; (2) a deep knowledge in marine currents and wind seasons around the globe; and (3) perfect navigational skills.

on future decisions. You don't just take your canoe through Cape Horn. These decisions have to be made very early, up to five years before the race.

For the insurance CEO, this means deciding what type of business model for what type of industry using a horizon of five years or longer. For instance, he must know which line of business the company is in and how it makes its money. Health insurance business profits from charging a higher premium to the policyholder while managing health-care costs that are paid to health providers. Risks associated with health insurance business are mainly strategic (with the Obama administration currently rewriting the rules of the game). Spread business profits from earning a good return on invested assets and passing only part of it to the customers (thus the company earning the spread between earned and credited rate). Risk here is mainly market risk. The P&C and life insurance business model is based on risk aversion,³ while the risks truly lie in pricing and underwriting. Again, the decisions have to be made very early.

THE SECOND CHOICE IS PLANNING.

For the sailor, this means which route he should take with a time horizon measured in weeks. These itinerary choices are bound by the type of boat chosen previously. All available routes are not created equal: some have better winds in some seasons; others have stronger currents. Depending on his boat structure and his own skill set, he may prefer wind over current, a smoother ride than a high risk and high speed route. In the 2008/2009 race, Guillemot took a better route than Davies close to the Brazilian coast, but he had more adventures (he was chased by some angry fishermen as his boat was caught in their fishing lines).

For the insurance CEO, this means capital allocation to business unit, reinsurance and other planning decisions with a time horizon of one year. He will allocate capital to a business unit that has a high ROE or a low risk pro-



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THE THREE HORIZONS THE FIRST CHOICE IS STRATEGIC.

For the sailor, this means what type of gear for what type of race: whether monohull or catamaran, small and light or strong and heavy, these choices will have a strong impact

FOOTNOTES:

¹ Unfortunately, I am well below this stage (but ready to be taught).

² Except in the Great Lakes area.

³ Customers are ready to pay a certain amount in excess of their variable expected losses to be able to remove uncertainty.

“For risk management purposes, most of this debate is irrelevant. All metrics should produce consistent risk profiles.”

file, and enter reinsurance agreements to reduce risks or to manage capital. This allocation is made possible by the capital level of the company (strategic level), which impacts tactical decisions later. Entering and exiting a distribution channel is another decision that needs to be made at this level, as well. Such a decision is either in compliance with the business model choice previously made or is reshaping it. The same decision will impact the universe of tactical possibilities.

THE THIRD CHOICE IS IMPLEMENTATION.

For the sailor, this means actually riding with a time horizon in minutes. He needs to pull the right rope to get the sail where it needs to be. Also, he has to understand where the sail needs to be. A one-quarter winch can lead to two additional knots per hour. Maneuvering room depends on the boat structure and the route chosen; decisions will be challenged if skills are misestimated.

For the insurance CEO, this means implementation with a horizon of a month or less. Value sharing between sales force, customers and company⁴ needs to be sorted out in order to sell enough profitable business just as private placement underwriting has to be performed properly to limit potential default.

INTERACTION BETWEEN HORIZONS

An upstream decision shapes possible choices down stream. A downstream choice must either comply with the upstream decision or force a shift from the upward decision.

For the sailor, this could mean

- Stop, fix the boat and go back to it—implementation issues may force him to rethink gear choice (Desjoyeux did just that on day one); and
- Turn around and change route if the shortcut is not worth facing the storm—implementation issues force one to rethink the route (for instance, Thompson was forced to turn back to shelter to wait for the Cape Horn storm to weaken).



For the insurance CEO, this could mean:

- Sales expenses are framed by the choice of distribution channels—previous choices constrain tactical decisions; and
- Distribution economics may lead to exiting a line of business—here tactical issues challenge the planning decisions.

OLDER AND NEWER SETS OF METRICS OLD RISK MANAGEMENT METRICS

For the sailor, this means feeling the boat hull to check for rough spots, climbing the mast to look for storms or land, looking at the compass, sextant and the sun's position to choose the route. Regardless of technology and new tools at their disposal, sailors will use some or all of these traditional approaches to feel comfortable with their decisions—either boat structure, route or their implementation. In other words, these old techniques draw a reliable picture in most cases.

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FOOTNOTES:

⁴ This includes sales incentives, expense structures, product design and apparent value for customers.

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For the insurance CEO, this means looking at RBC factors, Solvency I factors, liquidity ratios, greeks and other formulaic approaches. These measurements are very useful and are familiar to everyone. As such, communication is enhanced, people know their usefulness and issues, and they can adjust the metric to compensate any perceived shortcomings. In today's crises, companies are short on capital, whatever

the metric being used. As for old sailing techniques, these old metrics still correctly describe the risk faced in most cases.

NEW RISK MANAGEMENT METRICS

For the sailor, the new toolbox includes: night goggles, infrared goggles, radar, sonar, GPS positioning, depth finder and weather forecasts. At the start, sailors have healthy

EACH NEW METRIC HAS ITS PROS & CONS

Within the new set of metrics, there is a healthy debate regarding which metrics to use. For planning considerations, the candidates are:

- CTE on real world projection, advocated by the NAIC
- Risk neutral projection under stressed starting conditions
- Stochastic on stochastic
- Canadian approach
- Padded assumptions vs. conservative use of the end of the confidence intervals vs. best estimates

Differences are important in terms of:

- Robustness—prevention of gaming the measure / pre-approval of models / standard scenarios / auditability;
- Practicality considerations—compute time and shelf life of results / comparability of results / meaning;

- Shareholder vs. policyholder perspective—Shareholders are interested at VaR type of metrics due to their put option to walk away whereas regulators lean toward CTE measures as they have to pay off the policyholders in an untimely fashion;
- Percentile level—consistent across companies vs. linked to ratings with/without group support;
- Tail event measure vs. moderately adverse event measure; and
- Different workloads.

For risk management purposes, most of this debate is irrelevant. All metrics should produce consistent risk profiles. Comparison across risks should be identical when viewed either using a CTE(80) or a VaR(95) measure, and having a handful of CTE & VaR measures at different calibration points should cover most cases. For reserving, capital management and other applications, the choice of metrics carries more weight.

| Life insurance metric | Drawback | Sail metric | Drawback |
|---|---|---|--------------------------|
| VaR | Stuffing the tail | Depth measurement | Miss floating tree trunk |
| CTE on major risks, PAD assumption on other | Insufficient PAD as non-modeled risk correlated with tail event of model risk | Goggles and binocular | Miss submarine |
| CTE on all risks | Computer time and other practicality considerations | Sonar, radar, binocular, depth measurer, ... | Expensive |
| All metrics help avoid adverse movements in major risks (e.g., interest & equity risks) | | All metrics will avoid wreckage on the seashore | |

The concentration risk from buying bonds issued by an insurance group, which also happens to be a substantial reinsurance counterparty, is not captured by any of these metrics. Risk measurement will not be magically sorted out by regulators or rating agencies without any company efforts!

“The important thing is not which metric to use, but to know the shortcoming of the metric chosen and to be able to mentally compensate.”

skepticism regarding the new tools but after some time the mistrust wears off due to measurement improvement and by uncovering both the usefulness and shortcomings of the new metric. Weather forecasts are used globally; we all know that the one-day forecast is trustworthy on land and close to the shore, but only generally accurate in international waters. We also know that a two-month forecast is not worth the paper it's printed on.

For the insurance CEO, the new toolbox includes cash flow testing, C3 Phases 1, 2, 3, PBA, Solvency II, daily VaR and 10-day VaR and FAS 157; all stochastic in nature. Some of these metrics have been field-tested longer than others and are beginning to gain acceptance. People know what the New York 7 (NY7) scenarios are, and what failing a couple of these scenarios means. They also know how to either game or prevent gaming the projection and how to audit the calculation (e.g., NY prescription around some assumptions, assumption review, single cohort recalculation, etc.). Other newer metrics are just starting to be articulated.

The important thing is not which metric to use, but to know the shortcoming of the metric chosen and to be able to mentally compensate.

EACH HORIZON NEEDS ITS METRIC

For a sailor, this means

- Strategic—Boat hull to check and computerized hydrodynamic simulation;
- Planning—Prior experience, GPS and weather forecasts; and
- Implementation—Bare eye vision and depth measurement.

For the insurance CEO, this may mean the same metric(s) but with widely different calibrations.

- Strategic—Unknown to me.
- Planning—The standard metric is Solvency II within Europe. This is a one-year VaR Cash Flow metric for various risks with results correlated ex-post. The underlying

assumption is that issues can be dealt with by management on a strategic level given the company survives one year. In the United States, the standard metrics are the NY7 and C3 calculations, which are both statutory projections. These seven prescribed deterministic scenarios for interest rate movements have been around since the mid 1980s. Actuarial Opinion Memorandum readers must know how to judge the level of conservatism within the assumptions and how to adjust for the perceived realism of the scenarios. This current field test leads to a deeper audit. C3 Phases 2 and 3 are CTE calculations that suffer from problems similar to Solvency II:

- To model implies that there is model risk.
- To model implies that there is a historical data calibration risk.
- Shareholders/bondholders are not interested in the size of losses beyond their commitments and prefer VaR measures; regulators pick up the tab and want CTE.
 - Prescribed assumptions or prescribed economic scenarios sacrifice the company risk measurement for the convenience of comparability.
 - Solvency II—Using silo risk metrics implies that there is correlation risk. Again, a consistent measurement across all risk types means that there is comparability.
 - Solvency II—Underlying assumptions regarding that of modifying strategies in a stressed environment is now under review. For instance, raising capital or selling a large block of business under reasonable conditions has not been possible during the last 12 months.
 - C3—CTE measures the size of the catastrophic losses, where actual data is scarce and the modeling of behavior is even less accurate.⁵
- Implementation—The standard metric for an investment desk is either the daily or 10-day VaR Cash Flow metric for credit, market and operational risks. VaR models the frequency of losses above a threshold. The underlying assumption of that metric is that positions can be liquidated or hedged at any time without residual risk.

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FOOTNOTES:

⁵ For example, actual to expected differences are already difficult to track for interest sensitive dynamic lapses on deferred annuities under normal conditions. The use of using the same formula at the tail to set the reserve is debatable. The joint distribution of equity and interest at the extreme tail is also another controversy.

This metric is currently gaining ground, and various audiences are starting to understand its limitations:

- Again, to model implies that there is model risk.
- To model implies that there is historical data calibration risk.
- VaR provides no information regarding the size of losses above the threshold when losses happen.
- Silo risk management implies that there is correlation risk and consistent measurement provides comparability.
- Underlying the assumptions of instantaneous liquidable/ hedge-able positions is also under review, which may possibly negate the risk management purpose.


Yearly VaR vs. daily VaR. This is the same VaR tool calibrated at different levels. It also is impacted by other practicality considerations such as the shelf life of results or the scope. In the same way that sonar and radar are both based on the projection of sound or radio waves being broadcast and the echo being recaptured and analyzed to deduce what the shape of the environment is, calibration differences allow one to look under water while the other stay above water, differing VaR metrics allows to explore either sort term or long term horizons.

DON'T FORGET ANY HORIZON AND START MEASURING

Risk management should not be restricted to a single horizon. A company performing only implementation risk management is like a sailor who is very skillful at avoiding the icebergs surrounding his boat, but has no idea of why they are surrounding his boat in the first place.

Whatever is not measured is not managed. For each time horizon, measurement issues will arise. Management needs to be aware of any possible bias from the models, metrics and calibration (<http://www.wilmott.com/blogs/paul/index.cfm/2009/1/8/Financial-Modelers-manifesto>). However, analysis paralysis should be avoided at all costs. Companies should pick one risk measurement framework and implement it for each horizon, i.e., business models (five plus years), capital allocations (one year) and tactical decisions (one month or shorter). Finally companies should refine their framework based both external input and the internal actuarial control cycle.

This is a learning process. It is not to be able to produce numbers, but to fully understand what the numbers both represent and miss. ♦



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