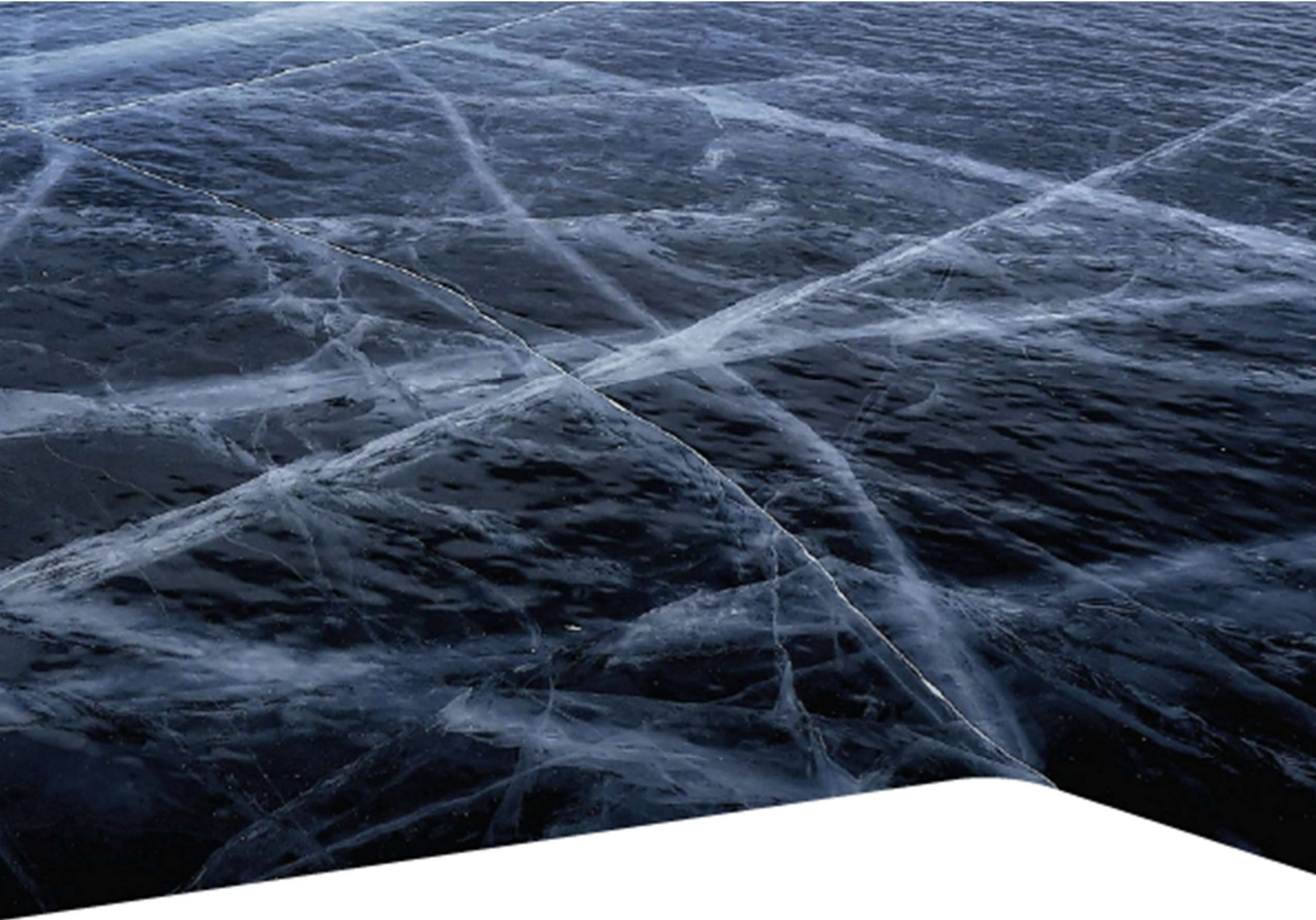




Crossing Thin Ice

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Table of Contents

Align ERM to the Company 3

Does the Starting Point Matter when Building Scenarios?..... 6

Your Own Factors for Your Own Risks..... 8

Ocean Acidification and the AMOC..... 10

To Our Subscribers 12



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Align ERM to the Company

By Dave Ingram

I used to think that there was one best way to do ERM and that when insurers adopted that approach, it would end up transforming the way that they did their business. That was 25 years ago, and the experiences I had of hearing most of the world's largest insurers talk coherently about their ERM programs definitely moved me off of that opinion. That was because those large company ERM programs were significantly different from one another and the cases where the ERM program had any success was when the ERM program fit with the business, rather than transforming the business to fit with the ERM program. Over the succeeding decades, I worked with well over 100 different insurers on their ERM programs and saw over and over the situation where a company tried to adopt the “Best” approach to ERM only to have the company reject that system sooner or later. The so-called Best approach just didn’t fit the company, it was too tight in some places and too loose in others.

Areas of Poor Fit

There are a couple of key parts of ERM that often do not fit with some insurers. They are not wrong in general, but they do end up being wrong in particular.

Aggregate Risk Tolerance - this is considered by many to be absolutely essential to true ERM. But high surplus mutual insurers in the US cannot be interested in even considering this concept. They just don’t see themselves ever having to worry about how much capital they have. And besides, it is often a source of pride that they are so highly overcapitalized.

Individual Risk Limits - some of the same companies will be reluctant to have limits for individual risks. They fear that the limit will be seen by their employees as an allowance to take that much risk. That the limit will encourage more risk taking.

There is a solution to both of those situations. The Aggregate Risk Tolerance and individual risk limits can both be replaced by Plan values. Then risk both in total and for individual risks will be managed mostly like everything else - with a target. In both cases, management can also treat those plan targets as checkpoints. A place where when they are met, they can pause and decide what to do next.

Another company might object to the formal **Governance structure** of ERM. ERM is seen as creating needless bureaucracy. Adding costly overhead to an otherwise lean operation. While working with one such insurer, I thought I was going to literally get tarred and feathered when I suggested that they needed to write down their risk management processes in a Risk Management Framework, no matter how brief it would be. They just did not want to be constrained by what was written on a piece of paper. In

By aligning ERM to a company's unique needs and traits, you create a risk management program that is embraced by the business

the end, all we ended up creating for their ERM program was a quarterly report that showed their risk positions compared to plans they showed to the rating agency. I was never sure that they even looked at it themselves.

Emerging Risk management is a troubling concept for some companies. But it often turns out that the people who are best at operating a risk management program that is focused on risk measurement and risk limit enforcement are just not the kind of person needed to imagine how risks that had never happened before might cause future harm. One such company had decided in 2018 that developing a work from home plan was just not feasible or necessary. They were faced with creating a work from home program from scratch while most employees were out of the office and under COVID quarantine. That included buying laptops for all their customer service staff, installing needed software and paying for them to be delivered to everyone's home and then training folks to adopt mostly new protocols.

And my "favorite" objectors to ERM are the business unit heads who are caught blindsided when a newly developed capital model shows that their business has the worst risk adjusted returns of any of the company's activities. It then becomes that business unit head's purpose in life to undermine the credibility of the capital model. This makes for a great burden of extra work to defend the model and often results in the model project being rejected because management is just not sure what to believe because before the model showed that result the product line had been thought of as successful.

On the other hand, a company that puts great value on data and careful analysis will not be happy with their ERM program until it is tied to a state-of-the-art model. However, that same company may also be reluctant to take risks seriously that are difficult to quantitatively model, such as operational risks or regulatory change.

A company that highly values innovation will want to use their emerging risks analysis to both identify risks AND to help them find new opportunities.

A company that values well managed processes will find a formal ERM governance process to their liking. They will see that it provides up to date information on how well their businesses are holding to the ERM program and that their risk exposures are in the range that they planned for. This would allow them to react to deviations in a timely manner and avoid any end of year surprises.

Four Steps to Finding a Good Fitting ERM Program

I follow these four steps to better tailor an ERM program to a company. First, we clarify their main objective for ERM. Is it a focus on capital adequacy, on managing year by year losses or improving returns for risks taken or something else? Second, we talk about their Risk Culture and examine their underlying risk culture beliefs. Third, they should build off their existing risk management strengths. All insurers have significant

risk management strengths, and that is a fact, not survivor bias. And finally, I try to instill the expectation that they need to expect to have an iterative process for developing a good ERM program with changes every year to trim away or fix what is not working and strengthen what is.

By aligning ERM to a company's unique needs and traits, you create a risk management program that is embraced by the business, influences strategic decision-making, and helps the organization navigate an increasingly complex risk landscape. The key is tailoring, not trying to force a generic "best practice" approach. With the right customized ERM, you can substantially improve the company's ERM practices and resilience.

Does the Starting Point Matter when Building Scenarios?

By Max Rudolph

When I think about an economic forecast, with aggregated results that include all interactions, I focus on the marginal impact on metrics like net income, cash flows and equity. This is an investor viewpoint, looking at alternative futures compared to letting the status quo play out versus adding a new asset class, product line or change in strategy.

But each point in time is different. Conditions change and so do future expectations. Expectations about the future economy will differ from the past if recent experience has been extreme. Think about 1919, 1978 or 2009. Examples can include high/low interest rates, high/low equity values or high claims. Should assumptions be updated going forward? The modeler has options. Assumptions consistent with recent experience can trend to a historical or new level, modeled using mean reversion or grading to accomplish this over a few years.

In my mind I picture mean reversion represented by a pendulum in motion. At a certain point all risks are at equilibrium and the pendulum is motionless at the center of a grid, but that rarely reflects the current situation. A pendulum has momentum, so is moving. Even without anyone pushing or pulling it moves away from the balanced position, decelerating until reaching a point where it slows and turns eventually back toward equilibrium. Add in outside forces and it becomes more complex.

Historically, scenario models have not had their assumptions altered due to a new starting point beyond changing initial interest rates. Equity valuations, for example, could be in bubble territory but the future return assumptions remain unchanged at the historical average. This is appropriate for regulatory purposes, as efficient market theory says that the current price is always right, but if market valuations differ significantly from the past, an internal strategy model may want to make adjustments. Incentives need to align with reality so management is not unfairly compensated (or underpaid). For example, when rates were near zero, I expect that some compensation schemes assumed rates would stay there and paid out bonuses when they instead rose quickly and resulted in excess returns. Was that value the managers added? I would argue that it's not.

Some models add a mean reversion factor for assumptions like interest rates with long historical data sets. This is helpful, especially for stochastic scenarios, but what about assumptions built around a risk like climate change? Those assumptions could grade to a future that reflects the impact of climate change. This is where we encounter unknown knowns, where you have historical data, but it is not predictive. Examples would include lower economic growth and higher property claims from extreme

Scenarios used for internal planning purposes should be as realistic as possible.

weather. Scenarios need to consider this, especially if they are expected to reflect long time horizons from a pension risk transfer contract or universal life policy.

When should you adjust assumptions based on changing future expectations? The answer varies on the time horizon requirements of the model. If you are projecting out for a short period, especially for regulatory purposes, using recent historical data as the base case may be okay when combined with some stress scenarios to determine assumption sensitivity. Deterministic scenarios can test extreme assumptions that reflect markets in 2007 or interest rates in 2022. That way you can see the impact on both sides of the balance sheet and test asset-liability management strategies. Longer term projections lead to deeper conversations.

The last few years have seen extreme weather events that would have been nearly impossible without current levels of greenhouse gases in the atmosphere and oceans. Hurricanes strengthen at record speeds, leave ten or more inches of rain in unexpected places and create heat waves that set records and lead to drought conditions. Someone modeling residential mortgages in the southeast United States to back insurance liabilities must recognize that the products are only sustainable if the assets backing them do not default en masse. Much of Miami is expected to be under water by 2060, with fresh water supplies at risk long before then. This is not in historical data sets but must be considered in projections. Miami is in a perilous position as it is built on porous limestone so walls won't keep the water out, but other coastal towns are also at risk due to a combination of sea level rise, coastal erosion and subsiding land. Notable American examples include New Orleans, Norfolk and Houston.

As temperatures exceed global records, morbidity and mortality will be adversely impacted and property claims rise above those previously seen. Those insuring populations near the equator need to become familiar with wet bulb temperatures. The human body needs time to recover each day from heat and humidity, and places near the equator will increasingly exceed these limits even at night. Some mitigations can help, such as building code improvements, but excess heat is entering the system. Until that changes the question is not whether temperatures rise and extreme weather increases, it's how it plays out with feedback loops and tipping points reached.

Scenarios used for internal planning purposes should be as realistic as possible. Assumptions should reflect what is expected to happen in the future. The time horizons considered should be as long as the liability pricing models and asset maturities, and these should be considered in tandem. More focus should be placed on assumption trends for long tailed liabilities that need all assumptions, including asset cash flows, to be reasonable across the entire pricing time horizon. Rules of thumb used as short cuts need to be revisited regularly as conditions change.

Environmental conditions are changing, and many think tipping points are being reached that accelerate the trend. Governments have run deficits during recently stable periods of late, leaving economies with reduced resilience. In a period of uncertainty, it is important to have margins in assumptions.

Your Own Factors for Your Own Risks

By Dave Ingram

An Own Factor Risk Formula (OFRF) can be a very powerful way to estimate and explain an insurer's risk capital position. It can be more accurate than the standard formulas used by regulators and rating agencies and light years more explainable than a stochastic model.

The OFRF looks just like the NAIC's Risk Based Capital (RBC). It is a series of multiplications of an exposure amount times a risk factor. For risks related to pricing and claims of property and casualty products, the calculation will usually be Premiums times a Risk Factor, where the risk factor varies by line of business. For an investment related risk like the variations in value of the stock market, the calculation is the Market Value of the stock portfolio times a Risk Factor. One key idea is that the Risk Factors are all calculated for a similar degree of adversity, such as a 98% likelihood loss.

This is the general idea behind the RBC formula. But in many cases, the Risk Factors are calculated on the average to be applied to the entire insurance industry. Sometimes there are company specific adjustments, which may or may not be similar in outcome to a true bespoke risk factor calculation.

The Own Factor development can take several routes. The first time I was asked to create a set of Own Factors, I was asked to research the history of the company (or the industry) and identify the worst one year loss for each major risk of the company. That meant looking at the 1918 Influenza pandemic for mortality and the Great Depression for investment related losses. I then calculated the factors based upon the losses at that time compared to the exposures at that time. A set of stress scenarios can be used for risks where it is believed that the true potential losses have not yet happened.

In another situation with a company that was a little over 25 years old, we developed the company's experience with each risk factor over their entire history and determined the standard deviation of their experience. For most risks, we then set the risk factor to be two standard deviations. However, we recognized that an implicit assumption of "normal" distribution of gains and losses was inadequate. Some risks, like their natural catastrophe risk, were fatter tailed risk. That means that they would expect larger losses than a Normal distribution would suggest for the tail loss. For those risks, we set the factors to 2.5 or 3 times the standard deviation based on knowledge we had about the range of industry losses for those risks.

A third approach is to use a full or partial stochastic internal capital model to set the factors. When a company has spent the time and money to develop an internal capital model, they usually want to use it. However, the time it takes to update a capital model for quarterly statements usually means that results will be available too long after the end of the quarter to be actionable management information. Instead, those results

The Own Factor approach can be the basis for a clear explanation of changes in model outcomes from period to period.

become mostly a part of historical analysis for many companies. Instead, they can use the Own Factor approach to estimate the quarterly risk capital amounts using factors that were created from the most recent model run. These results can be ready as soon as the exposure factors are finalized for the quarter. The magnitude of the changes to the factors from model run to model run can also be important information for the modelers, indicating where the model is most sensitive to changes in the exact composition of exposures and/or to the external conditions.

The Own Factor approach can be the basis for a clear explanation of changes in model outcomes from period to period. Those changes can be broken into “Volume Variances” and “Rate Variances” - we are doing more or less of the risk making activity or those activities are becoming more or less risky is the clear first order explanation. In addition, the factors can be compared to the industry level RBC factors to provide a simple comparison of the riskiness of your business to the industry.

This approach means that the risk calculation is much more closely related to the company’s own risk taking, rather than to broad industry averages. The one drawback is the situation mentioned previously where the factors are changing significantly from period to period. If that is happening for major risks of the company, then the more complicated process of full or partial internal modeling.

That need raises an interesting issue about the inherent variability of your business model. It means that the way you are choosing your risks makes them significantly unpredictable. Any planning related to your risks will be tricky to say the least.

But if your business is tamer than that, you can get a significant benefit out of using this Own Factor Risk Formula in terms of both ease and speed of calculations and ease of communication.

Ocean Acidification and the AMOC

By Max Rudolph

Climate change continues to upend our expectations. Scientists try not to scare us but they have a limited historical data set. They can't reach a 99th percentile result until 100 data points have been collected. While a picture of the distribution may be clear, the statistical result may be misleading with results more extreme than academia allows them to report.

Many research papers have focused on changes to the atmosphere, with oceans being considered only via sea level rise. I found myself wondering about what lies below the surface of these great bodies of water and how the ecosystems interact with greenhouse gases. The science, and the scenarios that result, are fascinating but scary.

Before humans came to dominate the earth, natural cycles led to excesses and shortages, with recurring mass volcanic events releasing huge amounts of carbon, creating mass extinctions. Five have been identified since the earth was formed over four billion years ago. Even the asteroid strike that ended the dinosaurs' dominant run came at the end of one of these volcanic events 66 million years ago. They are not common. During the industrial age humans have been releasing carbon dioxide, methane and other greenhouse gases into the atmosphere, trapping heat and warming the planet. A warmer atmosphere holds more moisture, trapping even more heat. Wind creates an interaction between the atmosphere and bodies of water, with oceans absorbing about 30% of carbon dioxide and almost all of the other greenhouse gases.

Carbon dioxide added to the oceans chemically reacts with the carbonate common to shellfish and coral skeletons, resulting in carbonic acid and hydrogen ions. The ocean is now more acidic by about 25% than it was in pre-industrialization periods, in addition to warming that makes hurricanes stronger, melts ice and expands water volume. A more acidic ocean makes it harder for these corals and shelled creatures to form and, in fact, a shelled creature like a crab or lobster sees its shell dissolve in even slightly more acidic water. Some areas of the North Atlantic are becoming more acidic at four times the rate near the equator. This future will be very stressful for the ecosystem, especially due to the alarming rate at which this change is occurring.

Another benefit the ocean provides to humans is movement of heat from the equator to the poles and cold back to the equator, using ocean currents sometimes called the global conveyor belt. This moderates temperatures in Iceland and northern Europe. Much as wind is driven by differences in atmospheric pressure between two points, ocean salinity and differences in density drive the currents. Saltier water is denser and sinks. Ice, frozen water absent salt, floats just above a layer of ocean that is sub-freezing. The dense water sinks near the poles, creating a current to replace it, and rises as it warms near the equator (upwelling) while also carrying nutrients from the depths to

the surface. Cold water is notoriously low in nutrients, so this upwelling is very important for ecosystem health.

These interactions have been evolving over billions of years. There have been times when the currents have slowed and even stopped, sometimes abruptly. As ice melts and fresh water flows from land masses like Greenland, this changes the dynamic and slows the current. When ice no longer forms it is unclear if the currents will stop or if a new equilibrium will form. Changes in rainfall patterns, creating new areas of drought and monsoon, would also be expected since the tropical zone where cyclones form (warmest area) is about ten degrees north of the actual equator due to the existing system of currents.

The currents rely on the formation of new ice near the poles that extracts salt

Some argue we are near various tipping points that could cause a cascade of accelerated warming. Melting ice sheets in the Himalayas, Antarctica and Greenland, Amazon die back and permafrost melt create feedback loops that seem likely to accelerate warming. To this we can add a threat multiplier – the current in the North Atlantic no longer carrying warmth to northern Europe and the United Kingdom.

A mass migration event due to what were thought to be local famines and extreme weather across the northern hemisphere followed the year without a summer (1816). This came after the eruption of Mount Tambora cooled the Earth by less than one degree Celsius. In our September 2022 newsletter and podcast #16, we described the movement from Europe to the US northeast and from the US northeast to what was then considered the US west, areas south of the Great Lakes. Six new states were recognized during this period, from Alabama to Missouri. If the Atlantic Meridional Overturning Circulation (AMOC) were to cease, temperatures in England would cool by at least five degrees Celsius. Podcast #22 (September 2022 newsletter) described ways that risks could interact, causing havoc to social and economic order.

It seems clear that continuing on the current path is bad news, somewhere between challenging bad and ecosystem collapse bad. The best case under the current path, with sea levels three feet higher than today by 2300 and food security dependent on technology, is a result that everyone should want to avoid. As interesting as the science is, the ramifications of acidic oceans and oceans without currents should encourage everyone to replace their use of fossil fuels with renewable energy sources.

To Our Subscribers

The content of this newsletter is meant to be educational and thought provoking.

Nothing in it should be interpreted as investment advice.

We hope that you all find this publication valuable. With a few short articles meant to provide unique insights, we present ideas about how to address specific issues related to risk management and introduce potential risks and opportunities that may not yet be on your radar.

Subscribers are encouraged to suggest topics for articles and ask questions of the authors during our follow-up webinars and podcasts. Ever cognizant of regulatory requirements, leveraging them to add value to you in practical ways, is our focus.



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3 to 5 articles quarterly written by Dave Ingram, Max Rudolph and other ARM consultants focusing on risks faced by insurers and risk management strategies.

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