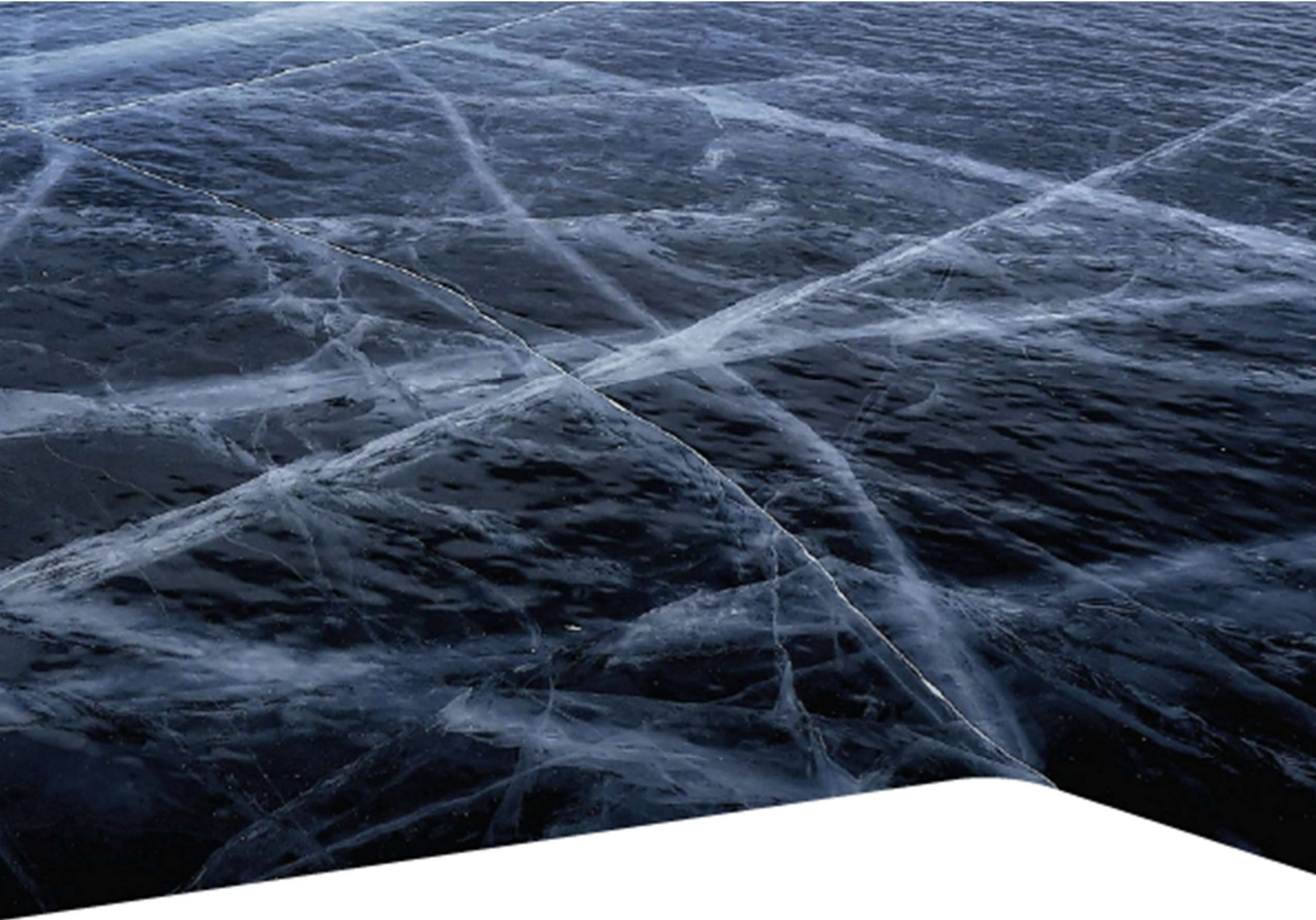




Crossing Thin Ice

3Q2024

ISSUE 11

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Risk Management Decision Making is Different!

I used to ask insurers what decisions they thought that they had made differently since they had added an Enterprise Risk Management program. Only a few ever gave a coherent answer. Sometimes that was because risk management thinking had not yet permeated the company and entered their decision making. But other times, it was because Risk Management Thinking had actually taken over. They now made almost all of their important decisions with their risk management thinking cap on. It is so firmly embedded that they are not actually consciously aware of how that changed things.

There are many parts to risk management thinking, but I want to feature five of them. You can look at these five and decide whether you think that your company practices risk management decision making.

1. Risk Awareness
2. Diversification
3. Risk Appetite and Tolerance
4. Risk Reward Management
5. Risk Management as a Competitive Advantage

Risk Awareness means that the company is always paying attention to downside potential in situations so that it can be sure to be adequately prepared for both the anticipated problems and for the Black Swans that come out of nowhere. It does not mean that the company will stop thinking about how to succeed, but it does mean that there will be both preparation to succeed and preparation to avoid failing. The risk management thinking here is about continuously updating and adjusting risk strategies based on new information.

Diversification means that the company will not be putting all of its eggs in any one or even just a few baskets; it means avoiding concentrations. An insurer with a diversification point of view will build off of their strengths, but not by exactly replicating the same activity over and over. The risk management thinking here is to know your risk profile and not allow any really large slices in the pie chart.

Risk Appetite and Tolerance doesn't care much about the source of the risks, it is focused on paying attention to the aggregation of all risks. This, of course, requires a risk model that includes all risks and a reason for setting a ceiling, be it regulator or rating agency or board or shareholders, or a statistical rule of thumb. Risk management thinking about Risk Appetite and Tolerance means that you need more than just a

"In any one year, there may not be losses that make all of the careful Risk Management Decision Making worthwhile."

ceiling, you need a reason for an amount of cushion as well. One insurer with one of the largest cushions wants to be the last insurer standing after the catastrophic event that bankrupts much of the rest of the industry. That is real risk management thinking.

Risk Reward Management is what you do next to take full advantage of the information that you needed to collect to do all the above. With Risk Reward Management you can add a new Capital Budgeting step to your strategic and operational planning processes that is built off risk management thinking. With Risk Reward Management, you will have truly turned the company into a Risk Management Decision Maker. With Risk Reward Management, each plan can be viewed as a request for a slice of the Risk Appetite in return for a promise of profits. The ratio of those two values, the return per unit of risk, can be compared from proposal to proposal. Diversification targets may limit the degree to which the company can fund the best returning plan. And Risk Awareness must have been applied to make sure that the best return for risk ratio is not simply an under appreciation of the actual risks of the proposal. Risk Reward Management is pure Risk Management Decision Making.

And finally, does this all add up to a Competitive Advantage? Over the long term, it most certainly will be. In any one year, there may not be the losses that make all of the careful Risk Management Decision Making worthwhile. There are years when it is much better to be lucky than careful. But over the long run, those off years will come. Companies that were concentrated in the wrong thing will be toast. And companies that were not aware of all the risks are highly likely to have become very concentrated. If they were not constrained by a risk Appetite, they might end up over-concentrated and over risk-exposed for a deadly one-two punch in the gut. The long run average returns for companies that were not doing Risk Reward Management will often end up being poor.

Risk Management Decision Making for an insurer, a company in the business of risk, is very different. For the most part, insurers recognize that their business success depends on thinking and decision making that are for the most part, very much like Risk Management Thinking and Decision Making. An insurer is only able to succeed if they understand the fundamental statistical basis for the insurance business. Risk Management Thinking and Decision Making means no less than doing our very best job at succeeding with the best tool that we have.

Model Assumptions under Increasing Uncertainty

Actuarial models have historically been complicated, with moving parts that drive other assumptions. They are a proxy for reality. Higher interest rates, for example, increase the likelihood that a bond will default or that the holder of a deferred annuity will surrender the policy. It's hard, and there is uncertainty, but the modeler can define the potential outcomes in advance as a statistical distribution.

Athletes chasing a soccer ball, football or puck recognize that, for them to intersect the path and make a play, they must anticipate where the object is going and what obstacles might get in the way. Friction, gravity and spin, along with actions of an opponent, are among the factors that come into play. This is a complex model, with dynamic assumptions interacting with each other. There are no closed form solutions leading to an optimal answer in a complex model. A well-known example is a Chinese proverb called the butterfly effect theory, where small changes from the flapping wings of a butterfly have a big impact. This demonstrates how climate can be impacted by small changes in a faraway land. Our models are evolving in this direction to be a better proxy for a complex and uncertain reality.

I think of static assumptions building from historical data to project the future, using straight line extrapolation and perhaps impacted by a changing trend. Assumptions are locked in but, even if the events interact, they have no impact on each other. Model assumptions are set for the duration of the model. In today's environment modelers must evolve, with assumption uncertainty recognized to improve resiliency.

Insurance has typically been priced, partially due to regulatory constraints, using complicated but static assumptions based on historical data. For example, the inflation variable increases if the underlying metric had increased the cost of car replacement parts. This practice is not sustainable in today's complex and evolving environment. In the past an insurer could load their experience with some conservatism and expect profits in most years. This is no longer true. Risks interact and changes are not always continuous.

The recent pandemic provided an example where results were exactly the opposite of what was expected. Health insurer pandemic scenarios expected low profits, but saw claims fall as the government paid for COVID19 care and patients deferred voluntary surgeries and regular checkups. Some of these costs never occurred as potential patients died from other causes, and some missed screenings led to deaths from more advanced stages of diseases like cancer that went straight to hospice care. Some insurers set up reserves, assuming these claims would catch up, while others let reduced claims fall straight to profit.

“GDP growth over the next 50 years is expected to average about half what it did over the past 50.”

Other disease patterns are changing and are considered emerging risks. Dengue fever and Lyme disease are occurring in new locations and seasons, effective vaccines for malaria are being distributed and bacteria are increasingly avoiding antibiotic treatments. Some changes improve patient outcomes while others lead to higher morbidity.

Asset assumptions can be modeled dynamically today but complexity and uncertainty are also present. Defaults vary based on rating and years since issue, inflation and risk-free interest rates are impacted by government debt levels, and cash flows are sometimes deferred. Investor behavior and expectations are moving targets. These assumptions will be impacted by a changing climate as sea level rises and extreme weather events increase claims from hail and hurricanes, meaning that longer time horizon investments add to the complexity. How these assumptions interact is also evolving and increases fragility.

Many products sold by insurers have multi-decade time horizons. What emerging risks could impact them? Permafrost is melting, releasing long forgotten frozen diseases and greenhouse gases back into the ecosystem. A warming atmosphere holds more moisture, making storms more severe. Melting glaciers mean that people who rely on snowpack from mountain ranges to release water over the course of a growing season will now see quick runoff of new precipitation directly to the sea. A strong solar storm would be estimated to cost hundreds of billions in claims and cause months, if not years, of disruption. Climate feedback loops lead to many expanding risks, but so do geopolitical events. These sometimes intersect, like climate migration, creating additional uncertainty.

A world war starting with high debt-to-GDP levels, where speculators are highly leveraged, could lead to chaos in the financial markets as currencies devalue and markets sell off at the same time. GDP growth over the next 50 years is expected to average about half what it did over the past 50. Throw in the odd volcanic eruption and earthquake and pricing actuaries should wonder how long duration products can be profitable, let alone sustainable. Scenario planners should consider these types of events as a type of preparation for an uncertain future. Not all will occur, but extremes happen all the time. They are not Black Swans. We should expect extreme events to happen even if we aren't sure which ones they will be.

Models and uncertainty

Whether it is wildfire risk to homes or mortality risk due to poor diets or improving pharmaceuticals, many of an insurer's assumptions are uncertain moving forward. Historical data provides a base to start with. Attribution analysis can help with climate risks. Cyber risk is complex, with aggressors and defenders leapfrogging each other to attack and defend computers, ATMs and the electrical grid. Model improvements will build off past successes like modifying assumptions for mortality based on changing smoking habits or improved countermeasures against hackers like two factor authorization. Those who are least prepared, with assumptions inappropriate for the future, will serve as low hanging fruit and be picked first. Imagining varying scenarios

leads to better anticipation of discontinuities and greater resilience using risk appetite goals.

Conclusions

We model as if we know the absolute answer, but uncertainty is a form of volatility. Awareness of uncertainty and avoidance of answers reported to the fifth decimal point may be as important as the output, with scenarios showing which exposures are material in a model.

In the last 30 years we have seen the dot-com bubble, mortgage crisis, a pandemic, repeated hurricanes and other extreme weather events, and sea level rise. Undisciplined government finances and geopolitical tensions make the world fragile. There is uncertainty, but knowledge that we need to be prepared and proactive. We can't identify specific events in advance, but something will prove difficult to manage going forward. Thinking about it in advance will speed and improve responses, improving resilience.



The difficulty lies not so much in developing new ideas as in escaping from old ones.

JOHN MAYNARD KEYNES

LLMs and Risk Management - on the Soft Side

Artificial Intelligence is a term that has become extremely elastic, encompassing a wide range of different computing tools that are only very tenuously related. Some definitions of AI reach far past current capabilities and attribute almost God-like powers to these tools. And tools they are, quite often very powerful tools. Perhaps we should think of AI like a new version of a chainsaw that can perform amazing work in the right hands, but also capable of removing limbs in the wrong ones.

Today, I want to stay away from the dangerous parts of AI and look at a few ways that risk managers can take advantage of the capabilities of one AI tool, the Large Language Model (LLM), to help with several of the qualitative tasks that a risk manager needs to do.

Environmental Monitoring

“Perhaps we should think of AI like a new version of a chainsaw that can perform amazing work in the right hands, but also capable of removing limbs in the wrong ones.”

Risk is far from static, the risk management program that merely quantifies and manages the same basic set of risks using the exact same model period after period will likely fail in its primary mission. There are four types of environmental monitoring that can be valuable to a CRO:

1. **Top Tier Risks** - Tier 1 risks that are so important to a company that they are regularly discussed with the Board, along with Tier 2 risks that the executive management team also pays direct personal attention to and sometimes discusses with the board, are the Top Tier risks of an insurer. For the Tier 1 risks, you have the risk owners, the risk management team, the executive management team and the Board all looking out for environmental shifts that could increase the frequency or severity of losses. And for Tier 2 risks, all those groups except the Board are paying attention. But certainly, the Tier 1 and most likely the Tier 2 risks are significant enough that one more “pair of eyes” on the risk may well prove to be worth it. Especially when that pair of eyes can quickly look many places.
2. **Tier 3 Risks** - These are the risks that are still on the company’s risk register and are technically the responsibility of someone on the executive management team, but in reality, they are likely to be subject to a more routinized risk management process. Using a LLM to regularly check for indications of shifting risk environments may be the most efficient way to get that done and protect against undetected risk escalation.
3. **Emerging Risks** - Only the largest insurers have the resources to afford a small group dedicated to tracking emerging risks. A LLM could be used to keep track

of new information about a preselected list of emerging risks and to give you an occasional list of potential new emerging risks.

4. Insurance Industry happenings - It might take some time and effort, but a LLM could be trained to look for the same sorts of industry news that you find important to read about on those occasions when you have the time to peruse industry news publications.

Summarizing

“Risk is far from static; the risk management program that merely quantifies and manages the same basic set of risks using the exact same model period after period will likely fail in its primary mission.”

LLMs are very good at producing short or even medium length summaries of long documents. And then there is the added feature that if you read a ten-point summary of a 30 page report, and you find that you are only really interested in item 6, the LLM will be able to expand that single sentence to a full page to allow you to get the full story on the particular items you want to know more about. Items that a CRO might want summarized:

1. Regulatory updates - After every state or national meeting of regulators, there is often a lengthy report or reports produced to document the activities. New laws and new regulations are also sometimes quite lengthy. A short summary with the LLM drill down capability would be ideal to keep up to date. In addition, the NAIC produces their Insurance Industry Snapshots, Analysis Reports and Capital Markets Bureau reports.
2. Federal Insurance Office (FIO) Annual Report - an overview of the U.S. insurance industry's financial performance and condition, as well as regulatory developments from a perspective slightly outside the industry.
3. The WEF Global Risk Report - a comprehensive analysis of the most pressing global risks facing the world.
4. Annual Insurance Industry Risk reports from major audit and consulting firms.
5. The Crossing Thin Ice Newsletters.

Expert Knowledge Sharing and Training

Recently an open source LLM was released (by Meta - Llama 3.1) with capabilities that rival or exceed commercial models and can be installed and run locally without any connection to the internet. This makes the use of a LLM for Expert Knowledge Sharing and training within a company much more practical because data entered in a local model will not be available to train a widely used public LLM. Expert knowledge that is the underlying basis for the company's risk models and risk mitigation practices including highly technical processes like embedded guarantee hedging and asset liability management can become a part of the knowledge base of the private LLM. It can then be queried by anyone working with those processes drastically reducing training costs and key person risk at the same time.

Another private LLM can also be trained with details about company products and plans, along with a full set of regulations and the tax laws that apply to the company's products. This LLM can be an invaluable resource for the risk management staff who

need to know this information but often find it difficult to get all their questions answered.

In both cases the LLM will be able to answer general or detailed questions, looking first at the locally provided information and secondarily at broader training data. The model can and should be trained to identify which source it is using to provide these answers. In addition, the models will need to be trained to avoid the imaginary answers - also known as hallucinations - that plague many users of the LLMs.

This is just a small sample of the ways that LLMs can be of use to the CRO and her staff. As they all get used to both the power and the limitations of LLMs and as the capabilities of the LLMs expand, I imagine that the LLM will become as ubiquitous as the spreadsheet. And as useful.

Spillover Revisited

One of our most popular topics to date, Spillover Diseases, was posted in early 2023. There is much to discuss on this topic that is new, so let's revisit zoonotic spillover diseases and provide an update based on recent developments.

COVID-19

While COVID-19 continues to evolve and surge, most cases are asymptomatic or resemble the flu. New long-COVID cases are less frequent than under earlier variants, and we should not assume that summer means no cases. The 1918 pandemic lasted multiple years and eventually faded as the population gained natural immunity, but it too saw surges in seasons unusual for flu. Reassortment continues down random paths that should be monitored and behavior managed. Surveillance gaps should be narrowed, with tools such as wastewater monitoring expanded across multiple infections.

For those signing up for fall vaccinations, keep in mind that seasonal flu vaccines fade after 3-4 months and COVID-19 vaccines after 6 months. Waiting on the flu shot/spray until activity normally picks up, such as November, may work better than getting it in August. Unless and until COVID becomes a seasonal disease, the elderly and immunocompromised should consider two shots per year when available (not medical advice, talk to your doctor and do your own research).

Bird Flu

H5N1, first identified in 1996, is an influenza strain traditionally called bird flu. There has been occasional bird to human infections, often from chickens, and mortality has been high at about 50%, but on fewer than 1,000 cumulative cases. The primary human symptom in 2024 is conjunctivitis (pink eye). Previous outbreaks of birds led to culls of flocks. Of late it has become a much larger concern, as dairy herds became infected and many other types of mammals are now believed to transmit within their own species and are thought to possess the ability to reassort the virus from both birds and humans (previously pigs were the primary concern for common reassortment with humans).

The economics of culling dairy herds would be expensive and is not currently being considered. Collection of public health data has been voluntary in most states so incentives are not aligned for dairy farms to cooperate. A cow or human that isn't tested can't test positive. There is concern that, much as predators and scavengers become infected after eating infected birds, that milk (especially unpasteurized) could carry the disease to humans.

More testing and transparency are needed. In addition, countries need a coordinated team that combines a variety of expertise, much like a successful risk team, including agriculture, emergency management, finance and economic experts. Stockpiles of PPE

and vaccines should be regularly checked for amount and quality. Building supply chain resiliency doesn't happen on its own.

Mpox

Another virus that should be on the radar for those being proactive about potential pandemics is Mpox. It is endemic in parts of Africa and has the World Health Organization's attention. A vaccine helped to protect the immunocompromised from a sexually transmitted version that spread to the US in 2022 but the virus continues to evolve and the current version largely impacts youth, especially in refugee camps. A concern is that it spreads via aerosol through the air rather than requiring physical contact.

Better Preparation

What can we learn by comparing the pandemics of 2020 and 1918? There are a lot of similarities. Each lasted several years, and neither was a quick three month ordeal. Surges did not follow the typical winter flu pattern for either, at least initially. There were spring and summer surges for both. It seems like the 1918 practice of locally determining lockdowns may be better than a national decision when the virus is surging only regionally. In the future, statistical rules might work best based on testing of sewage, shutting down in stages as positive results increase. This will be hard to put in place legally in the US but, along with mask and vaccine mandates, would clearly save lives.

With three times as many people today than in 1918, melting permafrost releasing long frozen diseases, and more people living close to pigs, poultry and other animals with receptor sites that allow reassortment between species, humans are more fragile to viruses.

A century ago, we saw morbidity across all but the oldest ages, but mortality primarily among young adults. The recent pandemic focused its worst on the elderly and those with underlying medical conditions. This will change for future pandemics. You can't devise just one strategy, assuming it will be same as a previous event. If the next pandemic impacts children, school shutdowns should be handled differently than if those aged 50+ are impacted.

Even the difference between the US demographics in 2004 when pandemic plans were developed versus what actually was in place in 2020 makes a difference. The federal government needs to continually study the subject and prepare for a wide variety of scenarios. Adding experts like actuaries, mental health and supply chain professionals would improve the societal impact, considering the economic and mental health impact in addition to morbidity and mortality.

"With three times as many people today than in 1918, melting permafrost releasing long-frozen diseases, and more people living close to animals that allow reassortment between species, humans have become more fragile to viruses."

Risk Culture Beliefs Survey

Thanks to everyone who helped out by responding to our poll on Risk Culture Beliefs. We received responses from 130 people, covered in three separate blog posts. See links to the results below.

Risk Culture Poll Results	
Risk Culture Beliefs Poll – Top 5	https://riskviews.wordpress.com/2024/07/08/risk-culture-beliefs-poll-top-5/
Risk Culture Beliefs Poll – The Middle	https://riskviews.wordpress.com/2024/07/11/risk-culture-beliefs-poll-the-middle/
Risk Culture Beliefs Poll – The Bottom	https://riskviews.wordpress.com/2024/07/10/risk-culture-beliefs-poll-the-bottom/
Risk Culture Beliefs Series	
Risk Management Beliefs Podcast	https://crossingthinice.podbean.com/e/risk-beliefs/
Risk Culture Beliefs Blog Posts	https://riskviews.wordpress.com/2024/05/14/30-risk-culture-beliefs/
Risk Culture ChatBot	https://riskviews.wordpress.com/2024/07/01/questions-about-risk-culture/
	https://poe.com/Risk_Culture_Beliefs

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 ERM 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.



Crossing Thin Ice Newsletter

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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