Climate Change and the General Insurance Industry

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Introduction

The public has long recognized the impact humans have on the environment. Climate change is one of the subcomponents of that impact and focuses on long term changes in weather and weather patterns. Weather-related events have and will continue to affect the physical, legal, and regulatory environment of the general insurance industry (property/casualty industry in the United States {USA}) both directly and indirectly.

The broader lines of business (with example sublines) within the general industry touched by weather conditions and events include:

Property Coverages

- Dwelling Fire
- Homeowners
- Business Owners
- Crop Hail

General Liability Coverages

- Public Officials Liability
- Professional Liability (Errors & Omissions)
  - Architect & Engineering
  - Contractors
  - Real Estate/Surveyors/Inspectors

Automobile

- Comprehensive

Workers' Compensation

Surety Bonds

- Contractor Completion/Performance Bonds

The above list is not exhaustive but covers those lines with recognizable exposure to potential loss. As societal expectations change with regards to responsibilities of improving climate change, so will the terms and conditions of the insurance contract. Whether related to pricing, reserving, or enterprise risk management (ERM), actuaries need to consider adapting the underlying assumptions and methods utilized within their processes to accommodate both the physical and social conditions that climate change brings.

Climate Change's Transformative Effect on General Insurance

Climate change refers to the long-term change in global weather patterns. This encompasses global warming, in addition to a broad range of changes that are happening to the planet, such as rising sea levels, shrinking mountain glaciers, accelerating ice melt in Greenland, Antarctica and the Artic, and shifts in flower/plan blooming times.[1]The paper is not intended to distinguish between man-made or naturally occurring cycles of climate change but concentrates on the aspects of change occurring today and in the future regardless of cause. What is addressed is a Global Issue, but for this article the focus is the United States.

Changes in climate conditions produce impacts on both the frequency and magnitude of certain natural catastrophe events, which has been part of the discussion for general insurance actuaries for several years. However, the associated environmental conditions influencing land usage and potential health related situations (e.g., extreme heat) also hold implications for General Insurance as societal pressures, just now emerging, alter the regulatory, social, and legal landscapes for insurers.

These now emerging issues mean the various lines of businesses are at different stages of recognition of weather-related events and their impacts.

For the main actuarial practices (pricing, reserving, and ERM), the underlying data, alterations to assumptions, and potential issues are very similar. The differences stem from the purpose of the practice (as outlined below) and knowledge of the event (pre- or post-event manifestation).

- Pricing reflects the realistic near-future possibilities of loss for the exposure period being considered, prior to the exposure period in question. Market conditions and regulatory limitations may impact the modeling framework included.
- Reserving reflects actual events after the loss occurrence is recognized within the exposure period. Depending on circumstances, the duration of recognition for either the occurrence or ultimate associated conditions of the occurrence determine the modeling framework.
- ERM reflects the full future and current potential possibilities that impact a diverse set of interconnected risks as related to capital and reflects the potential for more extreme event levels.

This article does not directly address each specific consideration for the practices above but provides a context of and a perspective on the changing landscape for reflection. These same considerations apply whether the business is on a Primary basis, Reinsurance basis, or an alternative mechanism such as Cat Bonds or Parametric Insurance.

Each line, subline and coverage of insurance engages differently to the various loss scenarios proffered by weather related events. This is due to how the respective coverage triggers react to the event conditions. Most property-oriented coverage triggers are straight forward as the event manifests. Liability coverage triggers however are susceptible to change over time with litigation and/or societal modifications. An example is the continual trigger definition for Construction Defect Claims that affected the General Liability policy in the late 1980s and the 1990s; [2] the trigger changed through court interpretation of how an event manifests. Similar potential litigation [3] is occurring for climate change and may influence several types of policies.

In addition, changing climate conditions will expand and require revision of loss scenarios, making incorporation of these potential future events critical to understanding the overall risk faced by insurers. As seen in several incidents such as The Camp Fire, [4] the initial expected insurance costs fell short of actual costs. Moreover, costs outside of the normal insurance claim structure occurred (victim aid, other economic damages) were significant. These costs can find their way back into insurance system via other routes such as subrogation and/or litigation. This extends the typical duration of claims from weather related events and provides further uncertainty in the process.

An opportunity for the General Insurance Industry would be lost if the work being done is used only for estimates or exposure avoidance. The same techniques and thought processes can increase resilience of the exposures faced as well as improve society. Risk reduction and proper planning benefits everyone. And as last resort insurers such as the California Fair Plan or Citizens Insurance Company in Florida become significant portions of the marketplace (and potentially insolvent), it is incumbent of both actuaries and regulators to understand and address the risks that all people in the jurisdictions face, not just those with insurance.

Considerations by Major Line of Insurance

PROPERTY-ORIENTED LINES: EARLY WEATHER-RELATED ADJUSTMENT ADOPTERS

Natural catastrophe events are most associated with homeowners, dwelling fire, and businessowners insurance policies. Automobile physical damage can also be included in this section given the comprehensive coverage is triggered by natural catastrophe events. It is not just the physical damage to property that is impacted. Coverages such as business interruption or contents can be triggered depending on the event and occurrence damage.

While natural catastrophe events occur with regularity, the variability in the underlying conditions of the surroundings at the time of manifestation makes scientifically based catastrophe models a necessity.

While the industry's, and particularly property insurance segments of the market, use of natural catastrophe modeling started in earnest after Hurricane Andrew in 1992, the discussion related to catastrophe modeling and climate change began within the general insurance industry in the late 2010s. The Casualty Actuarial Society Ratemaking, Product and Modeling (RPM) Seminar has presentations related to modeling issues in its Climate Change Resource Library beginning in 2019.[5] Modelers such as RMS (now Moody's) have climate risk models [6] for use in conjunction with natural catastrophe estimation today. For property-oriented risks, this information is, and has been, included as regulatory permissions allow for pricing products, as well as used for obtaining reinsurance, initial event reserve estimation, and discussing capital positions for organizations.

Most recently the State of California's Insurance Commissioner Ricardo Lara [7] announced changes developed to update regulation on the use of catastrophe models in the ratemaking process, including "the best available scientific information on risk mitigation at the property, community, and landscape scales, including risk mitigation initiated by local and regional utility companies." [8] This update is in response to the impact of extreme catastrophic events on the insurance industry within the state, including those events influenced by underlying weather-related conditions.

The active integration of science into natural catastrophe models is the norm for the industry. As previously noted, Moody's can incorporate climate modeling into natural catastrophe modeling, making it easier for actuaries to anticipate the effects of the issue. However, to the extent that the science related to areas such as risk mitigation is not fully tested, it is incumbent upon those utilizing results adjusted for these assumptions to fully understand the scope, the theory, and associated issues related to usage of that science. [9] [10]

LIABILITY-ORIENTED LINES: COVERAGES IN TRANSITION

Traditionally, liability lines have not been connected to weather related events. But those lines related to Professional Liability and the Directors and Officers type of coverages are seeing activity that could alter the legal and regulatory landscape moving forward. The American Bar Association has a Climate Change Committee which actively reports on litigation and potential avenues of practice expansion. Law firms have established Climate Practices and have begun to produce materials discussing insurance coverage and related risks. [11] Unlike other lines

of insurance, a significant component of what is considered loss for these coverages are the legal costs for the insured. These legal costs can easily range from 50% to 100% of the ultimate claim payment.

Cases such as Assad v. Seu [12] in which shareholders sued an organization for officers and directors "failing to take actions to mitigate wildlife risks and for misleading public regarding company's readiness for severe weather" are increasing. While these suits currently impact utilities such as Pacific Gas and Electric or energy companies such as Exxon Mobil Corporation, there exists a potential for contagion to public officials liability coverages and to other for-profit corporations [13] [14].

A recent Montana Supreme Court decision [15] puts public officials squarely in the cross hairs for not considering how greenhouse gas emissions (an underlying cause of climate change) for permitting purposes. While the case is not a significant step toward expanding the requirements to professions such as civil engineering, planners, and/or constructors, the construction industry has started thinking about the implications of climate change, including the associated increased risks of litigation.[16] The United Nations,[17] as well as other public institutions,[18] are producing materials related to urban planning that can be used as benchmarks that others could be held to in a court of law.

As legal and professional standards change and litigation practices expand, so does the potential exposure faced by various liability coverages. It is incumbent upon actuaries to consider these risks, or the lack thereof, in the underlying data to adjust the modeling assumptions utilized within their practices.

WORKERS' COMPENSATION: THE CONVERSATION BEGINS

Climate change will impact the health of individuals as well as the organizations needed to support the recovery of those feeling the effects. Discussions about the consequences that climate change may have on employees and health providers [19] occur regularly at industry functions. A short but thought-provoking LinkedIn article [20] by Ania Alexakos, CEO of ManyMedical Inc., highlights the issues in the workers' compensation space. The article includes several reference materials for researching the discussed issues further.

The National Council on Compensation Insurance (NCCI) discussed the beginning of its research into weather-related events and worker's injuries [21] at its 2024 Annual Insights Symposium. Organizations such as the Workers' Compensation Research Institute (WCRI) have likewise published studies such as the "Impact of Excessive Heat on the Frequency of Work-Related Injuries." [22]

This study addresses the change in workers' compensation injuries on days with excessive heat. As shown within that study, the underlying distribution of Injury Type shifts with the Cause of Injury being Excessive Heat. If there is an expectation that the number of excessive heat days rise, then the current underlying data is no longer representative of the risks in the future, requiring adjustments based on forecasted weather-related conditions. This is just one aspect of the potential impact of climate change on work conditions.

The United Nations, [23] and other organizations like the Environmental Protection Agency, [24] have attributed increased illnesses, injuries, and deaths from (1) respiratory and heart diseases; (2) pest-related diseases like Lyme disease and West Nile Virus; and (3) water and food-related illnesses to climate change. Climate change has also been linked to increases in violent crime and overall poor mental health. These latter situations have been discussion topics within the workers' compensation industry since the COVID-19 Pandemic.

While none of the noted causes are exclusively workers' compensation related, employers who fail to take adequate precautionary measures could face increased claim frequency not currently captured within the data utilized by actuaries. Forecasting potential changes within a book of business and the potential long-term influences of climate change are prudent strategic measures.

SURETY BONDS: AHEAD OF THE GAME

As noted previously in the Liability Lines section of the paper, the construction industry is taking note of the potential impacts of climate change. As noted in "The 4th Factor - Underwriting for sustainable development in surety bonds" [25] (page 5),

> *"Infrastructure developments such as ports, bridges, hydroelectric plants, grids, pipelines, and tunnels entail substantial completion and performance risks. Since infrastructure projects are exposed to these risks, engineering, procurement, and construction (EPC) contractors are often required to provide completion guarantees. Such guarantees can take the form of surety bonds, a specialised line of business in the insurance industry.*
>
> *A surety bond is an efficient tool to select contractors and to increase the likelihood of project completion in the event of default (Al-Sobiei, Arditi, & Polat, 2005; Awad & Fayek, 2012). They are cost-effective and do not rely on the limited lending capacity of commercial banks." [UN Environment's Principles for Sustainable Insurance Initiative, July 2018]*

Surety bonds allow infrastructure and other construction projects to occur and as such are a vital tool for a thriving economy. The risk services arena within insurance understands this and is discussing ways to help clients think about climate change. The article "6 construction bidding tips for ideal surety bond terms" [26] states:

> *"Using historical data to bid jobs may not yield the accuracy you need. Throw inflation and continued supply chain woes into the equation, and it's difficult to estimate costs and schedules. Then, add LEED certification, regulatory requirements, and hiring challenges to the mix. You may be in unfamiliar territory where expenses and timetables are less clear." [Whipple and McCarthy, 2023]*

These are the same considerations that actuaries should be keeping in mind for this line of business. The article goes on with six (6) suggestions, several of which would be prudent for actuaries to adapt within their modeling:

1. Do climate and catastrophe modeling before construction bidding.
2. Consider the impact of inflation on materials, labor, and financing.
3. Calculate the cost of green requirements.
4. Factor weather delays into construction bidding.
5. Pre-Plan for inhospitable weather; and
6. Build in OSHA compliance costs.

Summary

The General Insurance Industry has a broad range of products which have been, or soon could be, affected by issues related to climate change. While some of the conditions are readily apparent, many will take time to fully manifest. Being cognizant of the potential impacts and supplementing current modeling practices will provide a broad range of insights for the various actuarial practices. And these insights can inform other areas such as underwriting, claims, executive management, and regulatory bodies for use in their processes.

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