Clustering in the North Atlantic

Catastrophe bonds and the importance of reinstatement protection

The recent increase in catastrophe bond issuance demonstrates the (re)insurance industry's growing use of collateralized capacity to fund catastrophe losses. The caveat, however, is that this capacity is typically "single shot," also known as single occurrence, meaning that coverage does not reinstate after an event.

Yet, at the same time, research suggests that "clustering" risk, the increased probability of an event when one has already occurred, may be elevated for North Atlantic hurricanes. Together, these developments raise an important question: When one storm strikes, might another be trailing behind it? And is the risk-transfer industry prepared?

An observed weakness of catastrophe models is that they can fail to account fully for clustering. Atmospheric conditions, when exhibiting certain characteristics, can give rise to multiple events.

Clustering has been observed across many perils, geographies, and years. Hurricanes Charley, Frances, Ivan, and Jeanne struck the Southeast in 2004 followed by Katrina, Rita, and Wilma in 2005. Other examples include severe convective storm losses in the Midwest and wildfires in California.

Research published in Nature similarly suggests that clustering risk is elevated for North Atlantic hurricanes, indicating a tenfold increase in the likelihood of clustering and surpassing historically elevated patterns witnessed in the western North Pacific.

WHY CLUSTERING OCCURS

Clustering is supported by the principle that the climate conditions giving rise to one event can also increase the probability of subsequent catastrophe events. In September 2020, for example, five tropical systems were present in the Atlantic basin simultaneously.

La Niña can have a significant effect on Atlantic hurricane activity. While it produces a cooling effect in the Pacific, it can contribute to warmer conditions and reduced vertical wind shear in the Atlantic basin. Vertical wind shear refers to changes in wind speed and direction at different altitudes. Strong wind shear can weaken or disrupt the development of a cyclone while weaker shear can allow hurricanes to form and intensify. If La Niña conditions allow one hurricane to form in the North Atlantic, those same conditions may also support further storms.

However, clusters are not confined to La Niña years. In 2004, Hurricanes Charley, Frances, Ivan, and Jeanne all made North American landfall within approximately two months during neutral El Niño-Southern Oscillation conditions. La Niña may, therefore, increase the likelihood of clustering, but the phenomenon is not isolated to La Niña conditions.

WHY REINSTATEMENTS MATTER

If one hurricane can indicate an increased probability of an ensuing storm, insurers must consider the functionality of the instruments used to hedge these risks. In particular, the importance of reinstatements in reinsurance cannot be overlooked where multiple events may occur.

Catastrophe bonds have been used as a market solution since 1996, and issuance has reached record levels in recent years. Catastrophe bonds offer several benefits, including multi-year maturities and an alternative source of capital. However, transactions can involve higher fees, may lack long-term relationships with counterparties, and are frequently structured as single-shot instruments.

If clustered events deplete multiple buyers' limits, those buyers could enter the market for replacement capacity at the same time; yet, this is precisely when replacement protection may be most expensive or difficult to secure.

CONCLUSION

The phenomenon of clustering is not rare. Historically, only 40 percent of tropical cyclones have appeared alone. When evaluating program structure and stress-testing risk appetite, reliance on catastrophe models may not capture the full potential of this risk. Clustering, alongside other unmodelled or under-modelled factors, should therefore be considered as insurers seek long-term, stable protection.

Traditional reinsurance can be structured to provide automatic reinstatement of coverage when multiple storms affect the same region in a comparatively short period. The critical question is not simply how much protection is available before the season begins, but how much remains, or can be reinstated, after the first event and beyond.

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