

# Stuff Happens: A Perspective on the Unmodeled Risks Exposing Indemnity-Triggered Cat Bonds

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The strangest meeting in my career occurred in 2006.

Our actuaries made a presentation to the company's CEO and senior property underwriters, including me. The actuaries presented our actual losses from the 2004–05 storms against our catastrophe-modeled results. When compared side by side, the results had one thing in common: the actual losses did not match the modeled losses. The underwriters were not surprised, but the CEO bellowed, “Why are we paying so much for a catastrophe model that isn't accurate?”

We were surprised that he was surprised. It never occurred to us that someone might actually believe the model. We scrambled to offer the boss a variety of reasons for these “model misses.” The bottom line: stuff happens that cannot be modeled.

Fast forward to 2015. The capital markets' belief in modeling is similar to my CEO's prior to that meeting. Indeed, they may hold a deeper-seated belief in modeling because their industry has a long history with economic models. But the shift to indemnity-triggered bonds from non-indemnity-triggered bonds significantly increases the risk of a model miss and the possibility of a bond being called for payment. Such potential outcomes may not be well understood by capital markets, as these investors are not underwriters but are attracted to the historical returns on catastrophe reinsurance. Also, investors like the diversification of catastrophe reinsurance, as a slumping

economy does not cause bad weather, and vice versa.

First, a primer: what is a catastrophe bond? Investors in pensions or hedge funds commit capital equal to the amount or limit of the bond. The terms of the bond define the event(s) that will trigger the bond for payment and to whom the bond will pay. In return, the investors get a coupon (premium). If the bond is not triggered, the capital is returned to the investors. This is a simple explanation for a complex transaction; for a full description, read “What is a Catastrophe Bond (or cat bond)?” on the Artemis website.<sup>1</sup>

What is the difference between a non-indemnity- and indemnity-triggered cat bond? Non-indemnity-triggered bonds are just that; they are not triggered by the actual losses to the insured. Popular triggers for these bonds are indexes like the Property Claims Services (PCS) cat estimates. There are others. The article “Did Hurricane Odile Just Trigger the MultiCat Mexico 2012 Cat Bond?” details how a parametric bond was nearly triggered by Hurricane Odile based on the barometric pressure of the hurricane.<sup>2</sup> The important point for our discussion is this: the actual losses to the insured are not a factor in the trigger, so there is little or no unmodeled risk to a non-indemnity-triggered bond.

An indemnity-triggered bond is closer to a traditional reinsurance contract. There are two general types: an occurrence bond pays when insured losses from a single event exceed the attachment point of the layer; an aggregate bond pays when a series of events produce losses that exceed a specified retention. The Artemis article on Gator Re describes an indemnity-triggered aggregate bond that was coming close to being called in late December 2014.<sup>3</sup> Like traditional reinsurance treaties, indemnity-triggered bonds are subject to unmodeled risks that lead to model miss.

Michael Madigan has written a helpful article called “Finger on the Trigger.”<sup>4</sup> In it, he notes the recent trend toward indemnity-based triggers, as cedants prefer bonds that can be more closely aligned with the traditional reinsurance layers in their cat programs. He cites the need for investors to understand and be comfortable with the types of business included in the offering.

Indeed, it appears investors have become more comfortable with indemnity-triggered bonds. According to Willis Capital Markets Advisory and Artemis, indemnity-

triggered bonds accounted for over 70 percent of 2014 cat bond issuance. Some industry sources suggest that this shows that capital markets have more confidence in cat modeling, while other sources suggest that cedants have become more savvy purchasers and are requiring cat bond triggers to be aligned with their traditional reinsurance triggers.

Back to model miss: haven't traditional catastrophe reinsurers made a lot of money over the years, even with these unmodeled risks? They have, but the large influx of capital market capacity has significantly reduced rates. Coupon spreads and expected returns on cat bonds have come down significantly in the past few years.

In his article "How Much?," Adam Alvarez of InsuranceLinked.com analyzes this price erosion. He concludes that spreads and returns have dropped by 40 percent to 50 percent over the past two years.<sup>5</sup> So any margin in rates for model miss has significantly eroded.

The question may arise of whether the market price reflects the additional unmodeled risk assumed by indemnity-triggered bonds? The answer is, probably not, because the margins on non-indemnity- and indemnity-based triggers are about the same. Put another way, capital markets do not seem to demand a higher coupon for bonds with unmodeled risk.

Others may contend that cat modeling has come a long way since 2005 and ask whether it is more accurate now? Certainly, new versions have been released that incorporate the latest climate science and available engineering. However, the lack of storms, especially in Florida, means that the models remain largely untested.

Both traditional reinsurers and capital markets are making big bets on the accuracy of cat models. What are the unmodeled risks that contribute to model miss? Three are claims handling, policy coverage, and market changes. We will now look at assumptions as embedded in the model for each, as well as the kind of "stuff" that happens. Both commercial and personal lines are subject to model miss, but the bulk of cat bonds to date have been issued for personal lines.

### **Claims Handling**

Have you ever filed a claim with an insurance company? Was the experience like buying a book on Amazon?

The claims process is just that—a very high-touch process. There are field adjusters who look at the damage, staff adjusters who check the field adjusters, examiners who check the staff adjusters, etc. Multiply that process by the thousands of claims received in a hurricane, for example, and you can begin to see how claims handling affects paid losses.

Most of the claims data in today's models has come from the high hurricane years of 2004–05. What beliefs about claims handling from those years are embedded in the model? Here is some perspective on the situation today:

- Claims adjustment: The Florida homeowners market in 2004–05 was very different than it is today. In those years, national insurers with large, sophisticated claims staffs absorbed most of the losses. However, after the storm years, the national insurers largely pulled out of Florida. They were replaced by a number of smaller startup insurers. Unlike national insurers, these companies do not have their own field adjusters. Instead, they contract with third-party vendors to provide independent adjusters (IAs).
- Why does this matter? The models assume that allocated loss adjustment expenses (ALAE), or the cost of claims handling, should be about the same today as before, adjusted for inflation. However IAs are contractors and get paid a fee for handling a claim, usually a flat dollar amount that goes up as the size of the claim goes up. IAs like volume and can work for several insurers following a major storm. They have a personal economic incentive to handle a lot of claims. On the other hand, national insurers use their own staffs, which are paid their normal salary plus overtime for cat duty. The IA model will likely result in higher loss adjustment expenses in the next cat.

- How will Citizens Property Insurance Corporation impact claims handling in Florida? Citizens' policy count increased dramatically as private market capacity dried up after 2005. In the past few years, the company has successfully reduced its policy count, but it still has about 600,000 policies in force. Why does this matter? Because Citizens' IA fee schedule is generally higher than private insurers' fee schedules, it has the effect of siphoning fee-driven IAs from the private market, leading to potential delays in claims investigation. Delays are expensive.
- Public adjusters: No discussion on claims would be complete without a few words on public adjusters (PAs). Insurers generally agree that PAs drive up the cost of a claim; policyholders generally agree that they are effective advocates. Insurer-led legislative efforts to limit PA involvement in Florida have borne some fruit, including fee caps. However PAs remain active in the market, handling daily claims like fires and water damage. With the next hurricane, we sense that insurers will be generous with claim payments in an effort to keep PAs off the claim.

In short, the claims experience and expense advantage held by national insurers will be largely unavailable with the next Florida hurricane, and this will impact the dollar amount of the claims, as well as the cost of handling the claim. By how much? Who knows; it remains untested.

## **Policy Coverages**

Insurance policies are complex. My homeowners policy is twenty-five pages long, plus an additional sixteen pages of endorsements. My renewal came with five additional pages to explain the changes in coverages. And homeowners policies are not as complex as commercial policies. A large commercial insured can have a policy that is easily seventy pages.

How do cat models account for such complexity? They really cannot. The models are blind to policy coverages, but there is no question that broad coverage increases the actual loss. Models are sophisticated, but it would be unfair to ask them to account for all the complexity in coverage.

What are the coverages that contribute to model miss? Here are some:

- Any coverage that can increase the cost to rebuild the structure. Policies usually have

some limits for increased cost of construction or increased cost to upgrade because of building codes. In theory, any losses from increased costs or laws and ordinances from 2004–05 should be embedded in the modeled loss experience. However, building codes change, and in general there has been a trend to strengthen building codes since the last major storms.

- Any time element coverage, such as business income or extra expense. These are notoriously difficult to estimate, even for the fire peril. Policies can also be extended to cover business income loss from the lack of power as a result of downed power lines off-premises. Certain coverages can allow the insured to collect even after the damage is repaired.
- Any coverage or exposure that can increase the loss resulting from water damage to the inside of the structure. The high-valued home market in Florida has seen tremendous growth since the last major storms. Insurers like these homes because they are built to code (even though most are built on the beach) and have high wind deductibles. However, they also have high-quality interior finishes and high-valued contents. Water damage to the inside of a structure is always an expensive loss, and consumers are much more aware of the problems with mold.

It is worth noting that the Florida homeowners market has become more competitive. Rates have increased, reinsurance costs are down, and Citizens is actively depopulating. Insurers are competing on coverage as well as price. Screened enclosures come to mind. Long the subject of coverage restrictions, these additions are now receiving higher limits from some companies.

Commercial lines deserves a special mention. Policy terms can be very broad and limits very high in the large commercial segment. Not only is flood typically included, but difficult-to-model coverages, such as business income, extra expense, and contingent business income, are usually included. Commercial lines policies also have high limits for unscheduled locations, which by definition cannot be modeled.

### **Market Changes**

The saying “change is the only constant” is true for both

our personal lives and the insurance market. Here are some changes that have impacted the insurance market, as well as corresponding insight into how they impact cat models:

- The economy—A few years after the 2004–05 storm season, the U.S. economy went into a recession. New construction virtually ceased, and construction workers left the industry for other careers. Today, the economy has come back and construction is up, but there is still a shortage of experienced workers. In a major storm-rebuilding effort, costs would be significantly higher than valuation software would indicate, and the work would take longer to complete.
- Regulatory—Superstorm Sandy showed how quickly regulators insert themselves in the interest of protecting the public. They can waive catastrophe deductibles, reduce the contractual time for claims investigations and payments, and generally add stress to an already stressful process. Insurance companies are always easy targets, and more so following a catastrophe. No insurer wants to have its policyholder complaining on the nightly news. So, as one claims executive told me, the goal is to pay as much as you can as fast as you can.
- Legal—A somewhat obscure but foundational principle in property insurance is called “anti-concurrent causation,” or ACC. The wording is complex, but the intent is to exclude coverage for certain perils (such as flood) that happen concurrently with covered perils (such as wind). This language continues to be tested. Some courts have upheld it, and others have not. Some states have rejected it entirely.

As a practical matter, losses with both wind and water damage are very hard to adjust: how much loss came from each peril? A recent legal case over expert engineering reports on Hurricane Sandy-damaged properties is insightful. It illustrates how difficult it is to make a definitive determination on homes damaged by wind and/or water. The plaintiffs are homeowners who allege that inspection firms are under pressure to attribute damage from flood to wind or other excluded perils.<sup>6</sup>

It is wise to expect that some flood loss will leak into the wind loss. The newest versions of cat models allow users to include some flood loss from coastal storm surges, and one modeler has developed an inland flood model.

As if this was not enough, there is also reverse ACC. After Hurricane Sandy, insurance brokers on commercial policies realized that having storm surge included in the flood definition was a disadvantage because of low flood limits. Brokers now try to get storm surge in the wind limit; insurers resist, but the market is softening.

- Catastrophe data quality—Everyone now knows that the cat models mercilessly punish accounts with incomplete or unknown data related to construction, occupancy, or other building characteristics. The industry has steadily improved data quality over the years because agents and brokers understand that complete data results in lower premiums. They also understand that some physical characteristics “model better,” or offer lower expected loss, than others. For example, a hip roof models better than a gable roof. And a house built to newer building codes models better than an older one. The premium impact to the account can be significant, so the concern now is not incomplete data, but truly *accurate* data.
- National Flood Insurance Program (NFIP)—Congress seems content to subsidize primary homes but hit second homes and commercial properties with large rate increases to obtain actuarially sound rates. Expect private homeowners insurers to move into this space as rates increase.

How much should these add to the modeled loss and price? No one knows. These increases probably are not linear with increased storm size. Expect the percentage of unmodeled loss to be higher on larger storms.

Market change also affects the development of catastrophe models. Called “open source” or “own your risk,” modelers are allowing third parties to access and adjust the once-proprietary modeling algorithms that produce expected losses. The stated goal is transparency, but it could tempt users to, well, you know, make favorable assumptions. Bear in mind that there is little current loss experience available from which to make these decisions.

## **Conclusion**

I started my freshman year of civil engineering with the most advanced piece of technology at the time—the slide rule. Some of us, wanting to show our brilliance, took answers to three or four decimal points, but our professor would have none of it. “Slide rule accuracy,” she said, “was two decimal points maximum.”

In my sophomore year, I again invested in technology by buying a Texas Instruments handheld calculator. Surely its ten decimal places would provide greater accuracy. Building loads could be calculated down to the hundredth of a pound, and efficient structural designs would result. Not a chance. “Multiply your final load calculations by three, as a factor of safety,” the professor demanded.

Accuracy implies certainty. With loss estimates to the nearest dollar, cat models ooze certainty. But stuff happens. How to price for that stuff is the art of the business. Is there enough in current cat pricing to pay for the stuff? No one really knows.

Traditional reinsurers certainly do not think so. They are betting that capital markets will disappear after capital markets pay a loss from a major cat event. Capital markets beg to differ. My view is more nuanced. I think they will stay in the market if they pay a loss on events on which they expected to pay a loss, based on the model. They may exit the market if they pay on events on which they did not expect to pay a loss, based on the model. Comments similar to my CEO’s may be heard again.

Or, investors may exit the market if the interest rate environment gets stronger, or if a number of other things occur. After all, stuff happens.

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## Endnotes

1. See [www.artemis.bm/library/what-is-a-catastrophe-bond.html](http://www.artemis.bm/library/what-is-a-catastrophe-bond.html) (accessed April 2, 2015).
2. Artemis, "Did Hurricane Odile Just Trigger the MultCat Mexico 2012 Cat Bond?," September 15, 2014 (updated December 23, 2014), [www.artemis.bm/blog/2014/09/15/did-hurricane-odile-just-trigger-the-multicat-mexico-2012-cat-bond/](http://www.artemis.bm/blog/2014/09/15/did-hurricane-odile-just-trigger-the-multicat-mexico-2012-cat-bond/) (accessed April 2, 2015).
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4. Michael Madigan, "Finger on the Trigger," *Intelligent Insurer*, August 19, 2014, [www.intelligentinsurer.com/article/finger-on-the-trigger?utm\\_source=Insurance&utm\\_campaign=e7bf3baefc-Intelligent\\_Insurer\\_ILS\\_19\\_08\\_2014&utm\\_medium=email&utm\\_term=0\\_f246694353-e7bf3baefc-26010133](http://www.intelligentinsurer.com/article/finger-on-the-trigger?utm_source=Insurance&utm_campaign=e7bf3baefc-Intelligent_Insurer_ILS_19_08_2014&utm_medium=email&utm_term=0_f246694353-e7bf3baefc-26010133) (accessed April 2, 2015).
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