The Use of Hurricane Catastrophe Modeling in Insurance Ratemaking

Overview

Catastrophe modeling (cat modeling) is a risk management tool used by insurers, reinsurers, businesses and regulators to assess the potential losses caused by a catastrophic event such as a hurricane, earthquake or other natural disaster. Catastrophe models are available for the following natural hazards: hurricane, earthquake, fire following earthquake, severe thunderstorms and tornados, and winter storm. While much of the following is generally applicable to each of these risk categories, the focus of this article is in regards to hurricane catastrophe modeling.

Catastrophe models are utilized in property insurance ratemaking because they are generally accepted as the best available tool to estimate the prospective costs of risk transfer from natural disasters. The models combine historical disaster information with current demographic, building, scientific and financial data to determine the potential cost of catastrophes for a specified geographic area. The skills of many experts including meteorologists, seismologists, geologists, structural engineers, mathematicians, actuaries and others are used in the development and analysis of the models.

A catastrophe model inputs the data for a specific insurer on the given insurer's exposure to catastrophic risk. This data includes the location of the properties insured, the physical characteristics of the insured structures, and the insurance coverage applicable to these properties. These models help to ensure that an insurer is resilient enough to withstand a major disaster affecting its insured properties.

Catastrophe models estimate the average losses that will be incurred due to a particular catastrophic event or set of catastrophic events over either the near-term or long-term. It is important to note that catastrophe modeling is not predicting the number of hurricanes, for example, that will occur in a given year (as is the case with the National Hurricane Center's annual forecasts). Instead, catastrophe modeling assesses the potential losses that a portfolio of properties could sustain due to a catastrophic event or series of catastrophic events. A simpler way to understand this is the idea of flipping a coin -- while it may be the case that, on average, there is a 50-50 chance that the coin will land on "tails," that doesn't mean that it will land on "tails" when flipped. In the same way, these models estimate long-term average losses, not the year's actual activity.

Standards for Hurricane Catastrophe Models

The Florida Commission on Hurricane Loss Projection Methodology (Florida Commission) is currently considered the standard for the review of hurricane catastrophe models used for producing property insurance loss costs. Organizations, agencies and regulators around the country, including South Carolina, rely on the work performed by the Florida Commission.

Biennially, the Florida Commission adopts standards that modelers must meet in the following year in order to be accepted. There are general, meteorological, vulnerability (structural

engineering), actuarial, statistical, and computer standards. The standards are intended to insure that hurricane catastrophe models are based on sound methodology and on data in each of these areas. To be found acceptable by the Florida Commission, the hurricane catastrophe model must be determined to be acceptable by a majority of voting Florida Commission members for each part of each standard. A catastrophe model that is deemed not acceptable for any given part is determined to be not acceptable in its entirety for producing hurricane insurance loss costs for insuring properties in Florida.

There are parts of the hurricane catastrophe modeling process (such as the process used in the creation of a stochastic set of hurricanes and the relationship between wind speeds and damage for specific construction types) that are applicable regardless of the geographic area under consideration. As such, the Florida review process provides a wealth of information useful in determining that a particular hurricane catastrophe model is appropriate for producing property insurance loss costs in, for example, North or South Carolina, Virginia, or Massachusetts. South Carolina's approach has been to leverage the Florida Commission's review and focus on those portions of the hurricane catastrophe model that require a state specific review.

SCDOI's Regulatory Oversight of Catastrophe Modeling in Insurance Ratemaking

As a part of the review of property insurance rate filings, the Department reviews each insurer's use of all catastrophe models. One of the requirements for deeming a hurricane catastrophe model acceptable for producing loss costs in South Carolina is that the model was approved by the Florida Commission. Moreover, hurricane catastrophe models may only include long term projections.

As a part of the Department's ongoing efforts to enhance its review process and the overall regulatory oversight of insurance rates, last fall the agency hired three experts in hurricane catastrophe modeling to review the use of hurricane catastrophe models by South Carolina's property insurance industry. The expert panel's preliminary findings have now been received and the Department has since released the non-proprietary portions of the initial report while also announcing that we have scheduled a public hearing on this matter. Once the final analysis is received, the Department plans to leverage the panel's work and other input to enhance the Department's review process of insurers' use of hurricane catastrophe modeling in future rate filings. The public hearing is scheduled for October 9, 2013to receive additional input on the use of the models from other interested parties.

A copy of the nonproprietary portions of the panel's preliminary report and the public hearing notice are published on the Department's website and available by clicking on the links below:

- Evaluation of Hurricane Catastrophe Models Used in SC
- Notice of October 9th Public Hearing