
Catastrophe Risk Management

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Nature of the risk

Catastrophe risk is a ***low frequency - high severity*** risk, and as such the ***risk is an increasing function of business volume*** - the more business is written, the higher the probability of capital impairment.

Can never perfectly *quantify* risk (**need risk evaluation**)

Never enough cat premium to pay losses in “cat years”

Monitor exposure accumulations

Multiple evaluation methodologies

Historical perspective

1980s - increasing concern about exposure to cat losses

1989: Hurricane Hugo, Loma Prieta (World Series EQ)

Cat models being developed - frequently met with skepticism and pockets of resistance

Final push for the industry to adopt exposure-based cat modeling approaches provided by ***Andrew*** (1992) & ***Northridge*** (1994)

Abandoning experience-based approaches?

Excess Casualty (re)insurance

As attachment point rises, frequency of claims decreases and the average claim size increases

Scarce experience data to effectively evaluate these risks

Exposure rating methodologies (e.g. expected loss curves)

Commonly used experience rating and exposure rating approaches can be crude and have well known weaknesses.

Sound familiar?

Excess Casualty (re)insurance (cont.)

- Experience rating *and* exposure rating *are both used* – where possible - to evaluate risk and make decisions
- Industry is aware of shortcomings; acceptance of fact that ***no one method / model provides “right” answer***
- Yet decisions are still made, the business is still written

Risk introduced by models

- Cat models aren't replacements for predecessors – they are ***enhancements***
- Context is important
- Relative strengths and weaknesses
- No exposure model captures all risk sources (e.g. wind pools, residual markets, court decisions, legislation and regulatory action, contingent business interruption)
- Users *must* be diligent about reliability & accuracy of input data
- *All* models are ***and always will be*** incomplete idealizations of reality

Risk introduced by models (continued)

- Model developers / “super users” can become so focused on “getting the model right”/ choosing “right” model that they forget that models results are NOT facts
- ***Model results can be useful information***
- “Model is an adjunct to the analyst”
 - Combine output with judgment
 - ***NEED TO SYNTHESIZE***, not just analyze
- Actuaries should have a clear understanding of the scope and reliability of data, assumptions, appropriate use, strengths, weaknesses, etc., of models

Concerns about - and greater awareness of - appropriateness of models part of a broader discussion

- Macroeconomics
- Finance
- Intelligence Community
- Capital Adequacy

Recent Cat Modeling Developments

(Re)insurers need to - and (now) want to – ***own their view of risk***

2012 RMS and AIR agree to share exposure data schemes;
Eqecat joined in June 2013.

Share coding used for property characteristics.

Allows (re)insurers to easily produce input data for any of
the three vendor models

Broad movement in industry: “open the black box”

Transparency and scrutiny

Customization

Sensitivity testing of assumptions

Recent Cat Modeling Developments (continued)

Customization, control, embed own view of risk into modeling process

- AIR, EQE, & RMS released or releasing new software platforms with upgraded models, more transparency, HPC for greater speed and depth; cloud computing.

<i>Touchstone</i>	<i>RQE</i>	<i>RMS(one)</i>
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- RMS(one) will allow use of non-RMS models
- London based ***Oasis Loss Modelling Framework***
 - Not-for-profit, open platform for third-party catastrophe data, models and services
 - Simulation engine / calculator that firms can plug in and integrate models and data

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Most recent exposure draft (2013)

- Applies to the **selection** or **use** of catastrophe models
- Does not apply when designing, building, modifying, or developing a catastrophe model (or portion thereof)
- When selecting or using such a model, the actuary should:
 - Determine appropriate level of reliance on experts
 - Have a basic understanding of model
 - Evaluate if model is appropriate for project's objective
 - Determine that appropriate validation has occurred
 - Determine appropriate use of model / results

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Appropriate Reliance on Experts

- Make sure the “experts” are experts
- Consider extent of expert review / published opinions and any known significant differences of opinion among experts that could be material to use of model
- Has model met industry / regulatory standards applying to model or model testing / validation (if any exist)?

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Understanding of the Model

DON'T TREAT THE MODEL LIKE A BLACK BOX!

Understand basic model components and how they interrelate

Identify fields of expertise used in model development

Determine if model is based on generally accepted practices and be familiar with model testing and / or validation

Evaluate reasonableness of user input; understand relationship between input and output; confirm precision and accuracy of input consistent with the project's objective

Determine that output is consistent with the project's objective

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Appropriateness for Objective

- Is model appropriate for the project's objective?
- Consider limitations of the model, modifications to model output, assumptions needed.
- Adequacy of historical data in representing range of reasonably expected outcomes consistent with current knowledge
- Be aware of significant developments in relevant fields of expertise and if they are likely to materially affect the current actuarial analysis

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Appropriate Validation

The actuary should evaluate the reasonableness of the model output, considering the input and the project's objective, taking into account factors such as the following:

- how historical observations, if applicable, compare to results produced by the model
- the consistency and reasonableness of relationships among various output results
- the sensitivity of the model output to variations in the user input

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Appropriate Use of Model and Results

The actuary should use professional judgment to determine whether it is appropriate to use the model results to develop the actuarial work product. The actuary should also use professional judgment to determine whether any adjustments to the model output are needed to meet the project's objective.

Thank you...

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