



SOCIETY OF ACTUARIES

**ERM Symposium  
April 2010**

**6D: Property Catastrophe Risk Management and  
its Implications for ERM**



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ENTERPRISE RISK MANAGEMENT  
**ERM**  
Symposium  
*Where Cutting Edge Theory Meets Some of the Art Practice*

# Property Catastrophe Risk Management and its Implications for ERM

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*Where Cutting Edge Theory Meets Some of the Art Practice*

## Why Should We Study the Experience of Property Catastrophe Modeling in Insurance?

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## Why Should We Study Catastrophe Modeling?

- Property catastrophe risk has been modeled since the 1980's, but wasn't taken seriously until Hurricane Andrew in 1992
- There are many features of catastrophe modeling that make it easier than other risks:
  - The risk of natural catastrophe is not self-reflective
  - Payouts are similar for all players
  - Source of Concentration is well understood
- Catastrophe modeling is one of the most "tail focused" disciplines
- Today catastrophe models permeate the insurance industry



## Property Catastrophe Risk Management and Implications for ERM



### This session shall address the following questions:

- Context clearly matters when managing catastrophe risk, but are there any general rules or ideas that always apply? Can we make any generalizations or are all "solutions" firm specific?
- Are there any lessons learned from managing catastrophe risk that can be generalized to the broader question of the proper role of models in strategic decision making? Do decision makers understand the proper role of models in the strategic decision making process?
- Many firms are under intense pressure from outside sources regarding the management of property catastrophe risk. Is this pressure causing firms to take self destructive actions?
- What obvious improvements can be made to the processes currently employed? Which of the approaches in use today should be avoided and which should be emulated?
- What does the above tell us about the likelihood of ERM fulfilling its promise?

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What Does ERM Mean for You, as a Firm?

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## Generalizations

- Use a common language for risk across the organization and at all levels of decision making
- Always keep the goals of the organization in mind
- Don't get too focused on the tail
- Rank don't optimize
- Use both deterministic and stochastic analyses



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What's Going On? What's Not So Great About It?

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## Lessons Learned

- Having a model is just the beginning
- Believe your models the right amount
- Include some model-independent methods of managing risk
- When models are accepted within a whole industry that has benefits and drawbacks
- Some risks need capital while some need management



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What's Going On? What's Next? How do you do it?

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## Outside Pressure

- In general: no, but some caveats
- Certain highly catastrophe exposed products
- The model can become the risk
- Focus on per-occurrence and zonal probabilities rather than aggregate risk including frequency and all zones/perils



## Predominantly Property Company – 400 Companies

### Aggregate Metrics

Surplus	\$46 Billion
Loss and LAE Reserves	\$21 Billion
Direct and Assumed Premium	\$65 Billion

Estimated Reserve Risk = Plus/Minus 15% of Reserves      \$3 Billion

Estimated PML Risk = Plus/Minus 25% of Direct Premium      \$16 Billion

The Reserve Risk is not Likely to Vary Significantly from Company to Company

The PML Risk is Likely to Vary Significantly from Company to Company  
depending primarily upon location

## Predominantly Auto/Homeowner Company – 295 Companies

### Aggregate Metrics

Surplus	\$94 Billion
Loss and LAE Reserves	\$75 Billion
Direct and Assumed Premium	\$195 Billion

Estimated Reserve Risk = Plus/Minus 20% of Reserves      \$15 Billion

Estimated PML Risk = Plus/Minus 15% of Direct Premium      \$30 Billion

The Dominance of Auto Exposure Raises Relative Reserve Risk, and Lowers  
Relative PML Risk, Yet PML Risk Still Dominates Reserve Risk

## Risk Management Framework for P&C Insurers

- For any insurer with a significant portion of its business in property, its catastrophe risk is likely much bigger than its reserve risk, yet...
  - ✓ Regulators require actuarial opinions on reserves, but not on catastrophe exposure
  - ✓ P&C statutory statements have a section (Schedule P) devoted to reserve analysis, but no dedicated focus on catastrophe exposure
  - ✓ AM Best publishes standard reserve metrics by company, but nothing for catastrophes
- **WHAT IS WRONG WITH THIS PICTURE?**

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What's Going On? There's More to It Than You Think

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## Improvements

- Use aggregate probability distributions rather than single-event
- Move away from silo risk management
- Don't accept model output at face value
- Recognize unmodeled risk
- Retain ambiguity aversion



## Core Component Pieces of Catastrophe Risk Management

- Accurate Information
- Appropriate Model Parameters
- Appropriate Models/Tools
- Manage/Control Exposure
- Policy Loss Limitations
- Price for Catastrophe Exposure
- Reinsurance
- Resources to Manage Events
- Appropriate Target Returns
- Viable Multi-Year Financials

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## The Promise of Economic Capital Modeling

- The experience of catastrophe models should tell us what can be reasonably promised
- If expectations are reasonable, then the experience of catastrophe models should be very encouraging
- Risk models can give valuable insight, but will not give all the answers.
- Risk models are most effective if they are integrated into the “front end” assumption of risk for an organization
- Danger: risks tend not to be believed until they manifest

