

18 May 2009



Don't Be Left Exposed by Bad Exposure Data
Casualty Actuarial Society – CARE 2009 – Bermuda
Tim Aman, Chief Risk Officer, Montpelier Group

Historical context

What we look for

What we should look for

What we can do

1996 CAS Geo-Coding Survey

37% of respondents reported they were currently using geo-coded data for the monitoring of catastrophe exposures

91% report that they believe geo-coded data will become useful in the monitoring of catastrophe exposures

2008 E&Y Cat Exposure Data Quality Survey

Insured values

Always problematic	25%
Often problematic	50%
Sometimes problematic	17%
Rarely problematic	8%

Secondary Characteristics

Always problematic	33%
Often problematic	33%
Sometimes problematic	17%
Rarely problematic	17%

ECRA (1960s)

Data = premium volume by class and state

“PML” as $f(\text{premium})$

Travelers (1970s)



CRESTA (1977)

**Catastrophe Risk Evaluating & Standardising Target
Accumulations**

Standardized exposure information reporting

Gerling Global Re, Swiss Re, Munich Re



CRESTA reporting format



ACCUMULATION CONTROL FORM

NEW ZEALAND

NAME OF COMPANY	PERIL COVERED <input type="checkbox"/> EARTHQUAKE	LINE OF BUSINESS¹ <input type="checkbox"/> FIRE <input type="checkbox"/> RESIDENTIAL RISKS <input type="checkbox"/> COMMERCIAL RISKS <input type="checkbox"/> INDUSTRIAL RISKS	LIABILITIES IN FORCE AT AND FOR <input type="checkbox"/> GROSS <input type="checkbox"/> NET <input type="checkbox"/> 100% OF R/I TREATY	DEDUCTIBLE <input type="checkbox"/>% OF S.I. <input type="checkbox"/>% OF LOSS <input type="checkbox"/> AMOUNT ... <input type="checkbox"/> NONE
CURRENCY: NZD [IN 000] ²			NAME OF TREATY	

No.	ASSESSMENT ZONES	LIABILITIES (not reduced by deductibles)											
		BUILDINGS			CONTENTS			BUSINESS INTERRUPTION			TOTAL		
		No. of risks	Insurable value	Exposed value	No. of risks	Insurable value	Exposed value	No. of risks	Insurable value	Exposed value	No. of risks	Insurable value	Exposed value
1	for detailed description see map/legend												
2													
3													
.													
.													
16													
17													
18		Floater Policies											
1-18		Total											

¹ Statement applies to direct and indirect business unless otherwise stated

² Incidental other currencies to be converted, unless otherwise indicated

Please note: Insurable value = Full or total value

Exposed value = Indemnity limit, first loss limit, sum insured

Cat modeling companies (late 80s)

Initial reporting

Post-Andrew reporting

Post-Katrina reporting

Post-Ike reporting



Brokers (late 90s)
Client modeling
Data enhancement
Cost advantage
Portfolio optimization



Rating agencies (late 00s)

Level of geocoding

Construction, occupancy, year built, # stories, sq ft

Secondary characteristics

Replacement cost

Bulk entries / validation



Rating agency reporting format



25i. For the data used in the generation of the Catastrophe Loss Estimates provided in question 26, please provide the requested percentages based on Total Insured Values (TIV*) for property exposures separately for Personal business and Commercial business. For Workers Compensation data, please provide the requested percentages based on payroll. Responses should be post-geocoding.

(01) Category of data	Percentage of Data Containing Known Attributes**		
	(02) Personal Property %	(03) Commercial Property %	(04) Workers' Comp %
Location of Insured Properties/Workers Coded to the following level of detail:			
1. Exact Street Address			
2. Zip Code			
3. City			
4. County			
5. Other (please explain) (_____)			
6. Total of lines 1 through 5 (must sum to 100%)			
Characteristics of Property Insured or Property Containing Insured Workers:			
7. Occupancy Type			
8. Year Built			
9. Year of Last Substantial Risk Mitigation			
10. Construction Type			
11. Number of Stories			
Workers Comp Characteristics:			
12. Employee Count	X X X	X X X	
13. Payroll	X X X	X X X	

* Total Insured Value (TIV) is defined in the SRQ instructions.

** The percentage of data brought into the model that had known information for that category of data. For example, if 80% of the rating unit's personal lines data was given a value for year built, then show 80% in column (02) line 8.

25j. Please indicate if any of the data used in the calculation of the Catastrophe Loss Estimate provided in question 26 contains bulk coded data. Bulk coding of data includes methods, programs, or procedures that assign a pre-determined value or default value to a required data field when the actual value is unknown or missing and the assigned value is not verified for accuracy. This does not include geo-coding.

(01) Type of Business Using Bulk Coding Methods	(02) Category of Data Containing Bulk Coded Data (i.e. Occupancy, etc)	(03) Percent of Data Containing Bulk Coded Data	(04) Explanation/Reason for Bulk coding
1.			
2.			
3.			
4.			
5.			

Rating agency reporting format



25k.For the data used in the generation of the Catastrophe Loss Estimates provided in question 26, please provide the requested values and percentages based on Total Insured Values (TIV*) for property exposures separately for Personal business and Commercial business. For Workers Compensation data, please provide the requested percentages based on payroll.

(01) Category of data	Most Frequently Observed Value			Percentage of Data Containing the Most Frequently Observed Value		
	(02) Personal Property	(03) Commercial Property	(04) Workers' Comp	(05) Personal Property %	(06) Commercial Property %	(07) Workers' Comp %
1. Occupancy Type						
2. Year Built or Year of Last Risk Mitigation						
3. Construction Type						
4. Number of Stories						

25l.Please explain the methods used to verify the accuracy of data used in the Catastrophe Loss Estimate provided in question 26. This does not include geocoding. Please provide information for the five most important elements in determining the Catastrophe Loss Estimate. Examples include replacement cost, TIV, construction type, year built, occupancy type, etc. Verification methods include on-site inspection, third party vendors, software, independent audit, etc.

(01) Type of Business Verified	(02) Category of Data Verified (i.e. Occupancy, TIV, etc.)	(03) Percent of Data Verified	(04) Methods Used to Verify Data and Frequency of Verification	(05) Verification Performed By

25m.How are multiple location accounts handled when coding:

1. TIV for Commercial Properties Insured _____
2. Payroll & Employee Counts for WC Insureds _____

25n.

1. Do any of the property policies used to generate the catastrophe loss estimate provide time element coverages that are unlimited? (Yes/No) _____
2. If Yes, what percentage of the the total property TIV is associated with these policies? _____
3. If Yes, how is the unlimited time element exposure captured in the calculation of the catastrophe loss estimate? _____

Rating agency reporting format



Section D: Catastrophe Modeling & Data Quality

Question 13. Please disclose the percentage of property catastrophe exposed risks (as a % of total insured value, or TIV) that are geocoded according to the list below. Please disclose the % of data (as a % of TIV) that has been internally validated.

	Personal Property (%)	Commercial Property (%)	Reinsurance (%)
1. Street Address	0.0%	0.0%	0.0%
2. Full post/zip code	0.0%	0.0%	0.0%
3. Partial post/zip code	0.0%	0.0%	0.0%
4. County/State	0.0%	0.0%	0.0%
5. Billing address rather than location of property	0.0%	0.0%	0.0%
6. Unknown	0.0%	0.0%	0.0%
7. % of the above that has been validated	0.0%	0.0%	0.0%

Question 14. What proportion of risks (as a % of TIV) contain the following data attributes? Please also disclose the % of data that has been bulk coded, and separately, has been internally validated for commercial insurance and reinsurance property risks

	Personal Property (%)	Commercial Property (%)	Reinsurance (%)	Unknown (%)
1. Occupancy type	0.0%	0.0%	0.0%	0.0%
2. Construction age	0.0%	0.0%	0.0%	0.0%
3. Construction type	0.0%	0.0%	0.0%	0.0%
4. Number of stories	0.0%	0.0%	0.0%	0.0%
5. Square footage	0.0%	0.0%	0.0%	0.0%
6. Replacement value	0.0%	0.0%	0.0%	0.0%

Validated		Bulk Coded	
Commercial	Reinsurance	Commercial	Reinsurance
0.0%	0.0%	0.0%	0.0%
0.0%	0.0%	0.0%	0.0%
0.0%	0.0%	0.0%	0.0%
0.0%	0.0%	0.0%	0.0%
0.0%	0.0%	0.0%	0.0%
0.0%	0.0%	0.0%	0.0%

Question 15. What checks are in place to attest to the quality of data that has been bulk coded?

Is this enough?

Exposure information
Cat model output
Narrative

Things we look for...

Appropriate data

Detailed exposure information

Geocoding quality

Level of resolution

Vulnerability quality

Construction, occupancy

Secondary modifiers

Reasonableness

ITV assumptions

Year-on-year comparisons

Original rates



Quality of coding

Missing data

Data accuracy

Bulk / default coding

Homogeneity of exposures

“Lake Wobegon effect”

Quality of model for given region / peril

Industry exposure database

Consistency with experience

Implied severity distributions

Awareness of modeling limitations



Sensitivity to model weaknesses

Large risks

High excess policies

Aggregate policies

Business interruption

Deductibles

Commodity prices

“Step function” exposure

“Loss compression”

Business interruption

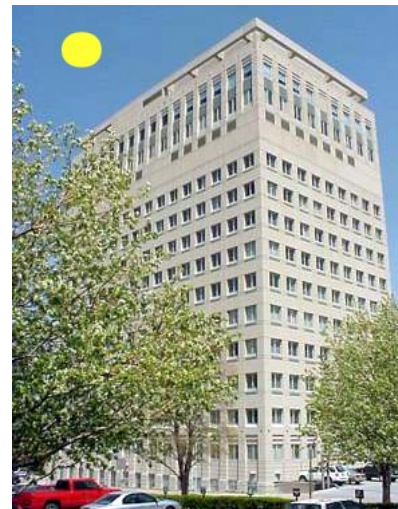
Difficult-to-model exposures



Things we should look for...



Impact of multiple events
Non-modeled perils
Policy terms & conditions
Reinsurance treaty
Original policies
Legal environment



Things we should look for...



Quality of management

Stability of portfolio

Claims settlement practices

Reinsurer relationships

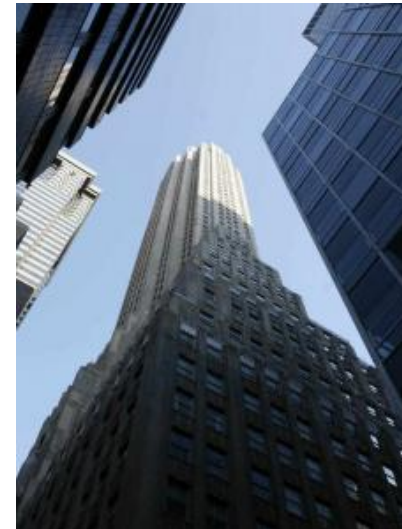
Buying rationale

Survival of company

Quality of broker / broking team

Willingness to answer questions

Ability to answer questions



What we can do...

Industry exposure databases

Location level data

Market share

Sensitivity testing

Parameter uncertainty

Stressed assumptions

Correlations

Confidence intervals

Awareness of modeling limitations



Credibility of experience

Historical events

Similar events

Manage PMLs and limits

“Model error”

Charge for limit



Understand modeling

Work to improve modeling

Communicate modeling uncertainty and limitations

Learn from experience

Anticipate future lessons



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on our company, products and team members:

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Aesop, circa 600 BC:

“A one-ey’d Stag that was afraid of the Huntsmen at Land, kept a Watch that Way with T’other Eye, and fed with his Blind-side toward an Arm of the Sea, where he thought there was no Danger. In this Prospect of Security, he was Struck with an Arrow from a Boat, and so ended his Days...”

The Moral: We are liable to Many Unlucky Accidents that no Care or Foresight can Prevent: But we are to provide however the Best we can against them, and leave the Rest to Providence.