INTRODUCTION
Catastrophe Aggregation Monitoring “quantifying the potential losses from catastrophic events, across all the policies sold by the company” is the 2006 MIICA.

Source: PricewaterhouseCoopers 2006
London Market Survey - CEO Quotes:

“Effective aggregation management is an imperative. If you could point to a benefit of the hurricane losses of 2005 it is the extent to which the monitoring of aggregate exposures is more visible and their management more disciplined within our business.”

“Our progress against our forecast aggregate tracks is now the first piece of management information the board reviews on a monthly basis.”
Storyboard

- Catastrophe Risk Aggregation is very high on (re) insurers’ agenda

- the pressure comes from capital providers, rating agencies, regulators and Lloyd’s.

- while principles are fairly simple, practical implementation is fraught with difficulties.

- the market is evolving quickly towards more robust approaches, and a wider spectrum of risks.
Agenda

- Introduction
- Why monitor catastrophe aggregations?
- Principles
- Current Developments
- Wider Risks
- Conclusions
Why monitor catastrophe aggregations?
Why monitor catastrophe aggregations?

- Shareholders/Names
- Regulator
- Rating Agencies
- ICA and other internal MI
### Why monitor catastrophe aggregations?

**Regulator**

<table>
<thead>
<tr>
<th>Feature</th>
<th>Red</th>
<th>Yellow</th>
<th>Green</th>
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</thead>
<tbody>
<tr>
<td>Appropriate accumulations considered</td>
<td></td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>All data captured</td>
<td></td>
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<td>✓</td>
</tr>
<tr>
<td>Outputs validated</td>
<td></td>
<td>✓</td>
<td></td>
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<tr>
<td>Output integrated with mgt processes</td>
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<td>✓</td>
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<td>Regular reporting</td>
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<td>✓</td>
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<tr>
<td>Robust modelling process</td>
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</table>
Why monitor catastrophe aggregations?

Capital Providers

- Potential downside requires distinct risk management approach
- Tend toward aggregation following periods of low activity
- Significant risk to solvency and capitalisation
- Impact on capital requirements and cashflow
Why monitor catastrophe aggregations?

Capital Providers

Source: www.moneycentral.msn.com
Why monitor catastrophe aggregations?

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Why monitor catastrophe aggregations?
Rating agencies

- More rigorous approach in their reliance on catastrophe modelling outputs
- A.M Best has announced higher minimum standards, with penalty loads for non-compliance
- A.M Best has now a single event, a terrorism and a second event stress test in their ratings methodology
- S&P is expanding its reinsurance catastrophe criteria to primary insurers, and replacing the NWP base approach
Why monitor catastrophe aggregations? MI including ICAs

- FSA wants to see the ICA used in the decision making process
- Insurance risks from catastrophe exposures can present the most significant risk within an ICA
- Reserve risk on known losses
- Underwriting risk on future losses
The Actuarial Profession
making financial sense of the future

PRINCIPLES
4-Step Exposure Management Framework

1. Defining risk appetite
2. Capturing exposure information
3. Measuring catastrophe exposures
4. Managing exposures
Defining Risk Appetite

Criteria
- Investors
- Cash-Flows
- Expected Profitability
- Availability Reinsurance
- Earnings Volatility
- Rating
- Solvency

Definition
- Annual Per Event
- Company-Wide Line of Business
- VaR/tVaR P(Ruin)
- Capital Premiums

The Actuarial Profession
making financial sense of the future
Underwriting Perspective

- HOMEOWNERS
- AUTO
- OFFSHORE ENERGY
- AVIATION
- COMMERCIAL PROPERTY
- WORKERS’ COMPENSATION
Risk Aggregation Perspective

The Actuarial Profession
making financial sense of the future
Measuring Catastrophe Exposures

Gross of Reinsurance

Net of Reinsurance

Reinsurance

Current Risk Position

Target Risk Appetite

Annual Loss $m

Exceedance Probability/%

0 1 5 10

0 1 5 10

Gross of Reinsurance

Net of Reinsurance

The Actuarial Profession
making financial sense of the future
Managing Exposures

Risk 1

Catastrophe Risk Aggregation

Risk n

UW Decision

Marginal Pricing

Capitalisation

Reinsurance

Strategy

The Actuarial Profession

making financial sense of the future
CURRENT DEVELOPMENTS
Speedometer for Underwriting

reliable

real-time

all terrain
Robust Processes & Controls

**Exposure Leakage**
- exposure growth
- non-geocoding exposures
- non-modelled accounts
- non-captured exposures

**Catastrophe Modelling**
- model selection
- data quality
- modelling assumptions/third party modelling
- non-modelled elements
- adjustments to modelling outputs

**UW Silo Culture**
- underwriting culture for certain classes
- class-specific aggregates monitoring
- becoming a business partner for UW

**Controls Framework**
- time consuming & complex processes
- quality assurance
- process automation
Real-Time & All-Terrain

- “macro” models:
  - think “macro-economics vs. micro-economics”.
  - based on hedge-fund risk assessment frameworks.
  - decomposition of risk factors and key drivers.
  - striking the right balance between accuracy, complexity and robustness.
  - more easily expandable beyond pure catastrophe risks.
  - faster analysis… real-time?
  - still work in progress…

- a wider spectrum of risks.
WIDER RISKS
"Our enemies are innovative and resourceful, and so are we. They never stop thinking about new ways to harm our country and our people, and neither do we."
Terrorism Modelling

Likelihood

Geography

Damage

Source: RMS
Epidemics

- Influenza pandemics are recurring events.
- The world may be on the brink of another pandemic.
- All countries will be affected.
- Widespread illness will occur.
- Medical supplies will be inadequate.
- Large numbers of deaths will occur.
- Economic and social disruption will be great.

CONCLUSIONS
Key things to take away

- Catastrophe risk aggregations monitoring is becoming increasingly important in the long term management of a cat exposed (re) insurer

- There are a number of external parties that want information on the level of catastrophe aggregations and how they are monitored. Examples include capital providers, rating agencies, regulators and Lloyd’s.

- The market is evolving quickly and requires a more robust approach than has historically been used.