TAIL ESTIMATION USING DETERMINISTIC METHODS

Realistic Disaster Scenarios

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Introduction

- Overview & History
- Recent Developments
- Pros & Cons
- Sample of Historical Disasters
- RDS Case Study

Overview & History

- Stochastic models give probabilities of extreme events. Deterministic models are unencumbered by need to quantify probability/frequency of severe events
- Parameter uncertainty can be a problem in stochastic models. Stochastic modeling not intended to be "the answer". RDS can supplement or replace.
- Genesis of property CAT modeling inspired by RDS
  - "What if Northridge EQ occurred today?"
- Bank stress tests / Scenario Analysis

Overview & History

- Lloyd's an early adopter of RDS
  - Implemented back in 1995. Requires that its syndicates test against events in "key disaster areas" where Lloyd's has peak exposure. Additional scenarios are required for syndicates that have exposure over a certain threshold.

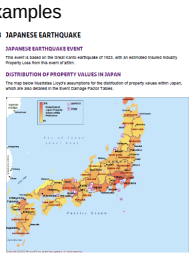
"The question of return period is one that's vexed us somewhat over the years," says Paul Nunn, head of exposure management at Lloyd's.

Overview & History

- Lloyd's RDS – examples


COMPULSORY SCENARIOS
1 TWO EVENTS
2 FLORIDA WINDSTORM
3 GULF OF MEXICO WINDSTORM
4 EUROPEAN WINDSTORM
5 JAPANESE WINDSTORM
6 CALIFORNIA EARTHQUAKE
7 NEW MADRID EARTHQUAKE
8 JAPANESE EARTHQUAKE
9 UK FLOOD
10 TERRORISM

SCENARIOS SUBJECT TO DE-MINIMIS REPORTING
11 MARINE
12 LOSS OF MAJOR COMPLEX
13 AVIATION COLLISION
14 SATELLITE RISKS
15 LIABILITY RISKS
16 POLITICAL RISKS
17 ALTERNATIVE RDS A & B


8 JAPANESE EARTHQUAKE
JAPANESE EARTHQUAKE EVENT
DISTRIBUTION OF PROPERTY VALUES IN JAPAN


GREAT KANTO EVENT FOOTPRINT
INDUSTRY LOSS LEVELS
PERSONAL ACCIDENT
LIABILITY BUSINESS

Recent Developments

- AM Best – New ERM section in SRQ asks for a company to estimate impact of RDS

56b. Within each risk type listed in the table below, what has management identified to be its largest potential threat to the overall financial strength of the rating unit?

Risk Type	(01) Description of Risk/Event/Scenario	(02) Estimated Potential Impact ($000s)	(03) % of 2010 Group PHS
Market Risk			
Credit Risk			
Underwriting Risk			
Operational Risk			
Strategic Risk			
Liquidity Risk			

Inflation RDS

56d. In the table below, please describe 3 potential future general inflation scenarios that your rating unit has identified as stress scenarios for the rating unit. In addition, please provide the estimated overall net impact on the current net loss reserve position and the rating unit's planned mitigation strategy associated with each stress scenario, if any.

	(01) Description of General Inflation Stress Scenarios	(02) Estimated Impact ($000s)	(03) Planned Mitigation Strategy
1.			
2.			
3.			

Pros & Cons of RDS and Deterministic Models

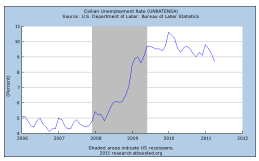
- Pros
  - Intuitive and easily communicated with stakeholders and non-technical executives
  - Management faced with "reality", forced to deal with threats to firm. Fosters discussion about risk.
  - Flexible. Historical loss data not necessary
  - No need to worry about tail fatness
  - Can be used for casualty lines when tail estimates are problematic
- Cons
  - Arbitrary
  - Data capturing (e.g., limit accumulation at a specific location)
  - Did you select a "realistic" disaster scenario? Or was it not adverse enough?
  - Can be easily overwhelmed by specificity
    - *Forward-looking* instead of *historical event data*
    - What is the "next Asbestos"?

Pros & Cons of RDS and Deterministic Models

- *Con - Did you select a "realistic" disaster scenario? Or was it not adverse enough?*
  - In early 2009, the Treasury conducted stress tests for large US Banks. The "More Adverse" scenarios proved not adverse enough.

Table 1
Economic Scenarios: Baseline and More Adverse Alternatives
(Minus signs indicate negative values)

	2009	2010
Real GDP [1]		
Average Baseline [2]	-2.0	2.1
Consensus Forecasts	-2.1	2.0
Blue Chip	-1.9	2.1
Survey of Professional Forecasters	-2.0	2.2
Alternative More Adverse [3]	-3.3	0.5
Civilian unemployment rate [1]		
Average Baseline	8.4	8.8
Consensus Forecasts	8.4	9.0
Blue Chip	8.3	8.7
Survey of Professional Forecasters	8.4	8.6
Alternative More Adverse	8.9	10.3
House prices [4]		
Baseline	-14	-4
Alternative More Adverse	-22	-7



- Actual outcome: 2009 U3 employment rate – 9.7%; 2010 – 10.6%

RDS Case Study - Casualty

Analysis of Adverse Scenarios in Stochastic Modeling

Net Retained Loss Ratio			
		Gross	With Reinsurance
	Average	70%	72%
2.0%	1 in 50	120%	115%
1.0%	1 in 100	140%	120%
0.4%	1 in 250	150%	130%

- Issue – BOD doesn't believe adverse scenarios are adverse enough. Stochastic modeling underlying these results are based on a blend of experience and exposure analyses
  - ECO/XPL exposure
  - Systemic risk exposure

RDS Case Study - Casualty

Supplemental RDS Analysis

Net Retained Loss Ratio			
		Gross	With Reinsurance
	Average	70%	72%
2.0%	1 in 50	120%	115%
1.0%	1 in 100	140%	120%
0.4%	1 in 250	150%	130%
Scenario 1	Additional Net Loss	10	6
	Net LR Impact	5.0%	3.0%
Scenario 2	Additional Net Loss	50	17
	Net LR Impact	25.0%	8.5%

Notes
Scenario 1 is a $10M Per Risk Loss
Scenario 2 is a $50M Per Risk Loss

- Optional solution – Create and adverse scenario that the BOD is concerned about. Get "buy-in" from BOD on scenarios.

RDS Case Study - Casualty

- Other optional solutions
  - Use (adjusted) historical data
    - Actual disasters, adjusted for company footprint
    - Historical adverse Accident Year
    - Historical adverse Accident Year – industry group
  - Reverse scenarios
  - Forward-looking scenarios

Sample of Historical Disasters

- Hotel Fires
- 9/11
- Rhode Island nightclub fire
- BP Texas City explosion & many other industrial accidents
- Enron
- Rogue Doctors / Nurses
- Asbestos & Tobacco
- Ephedra

The risk of courts to unfavorably interpret coverage is not easily captured by stochastic models

- Asbestos (stacking limits)
- Katrina (wind vs. water)
- Chinese Drywall (May 2011 FL court decision à "gas = smoke")
- ECO/XPL

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