Evaluating Loss Scenarios and Stress Tests to Determine Insurer Financial Strength Ratings

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Chief Rating Officer
A.M. Best
Loss Scenarios & Stress Tests for FSRs

A.M. Best’s Rating Methodology
• Balance Sheet Strength
• Operating Performance
• Business Profile
• Enterprise Risk Management
BCAR measures risk adjusted capital adequacy

- Applies stochastic-based risk factors within the model, with factors generated using stochastic simulations from probability curves and ESG
Loss Scenarios & Stress Tests for FSRs

Stress Testing the Balance Sheet via BCAR

- Natural Catastrophes
- Terrorism
- Sovereign Default
- Investment Concentration
- Country Risk
- Reinsurance Dependence

... but what about Casualty Catastrophes?
Loss Scenarios & Stress Tests for FSRs

Best’s Supplemental Rating Questionnaire (SRQ)

If loss scenario analysis is performed as part of the casualty catastrophe risk management process, please provide top 5 scenarios and the financial impact (% of capital & surplus)

Responses:

- Industrial Loss – WC
- Mass Tort Product Liability (DEHP) – GL, XS Liability, MPLI
- Global Economic Meltdown – D&O, E&O, Trade Credit, Casualty
- Cyber Terrorism – Cyber, BI, GL, Marine, E&U, D&O, Prof. Liab.
- Consumer Product Issue (e.g. mobile phones) – Casualty
Loss Scenarios & Stress Tests for FSRs

Enterprise Risk Management

Assessment of the overall risk management framework

Assessment of the risk profile of the company relative to its risk management capability

Overall assessment of ERM
Use test
Performance under stressed environment
Loss Scenarios & Stress Tests for FSRs

Best Practice Observations

- Continuous efforts to identify new risks
- RDS, Stochastic, Deterministic stress testing performed
- Dedicated resources and tools to identify emerging risks
- Data quality and accessibility enable early detection
- Explore low probability but high severity events

Note scoring of ERM building block ranges from +1 to -4
Thank You
Appendix

Details of A.M. Best’s
Natural Catastrophe and Terrorism Stress Tests
Nat Cat Risk and the Rating Process

• Balance Sheet Strength
  – Does the company have the financial wherewithal to absorb potential losses?

• ERM
  – Is the company effectively managing its catastrophe risk through stress testing?
ERM

• Onus is on management to
  1. Be acutely aware of issues specific to the company’s individual geographic exposures
  2. Be able to properly manage those risks with accurate data
• Analytical focus is on data quality and the tools used to manage exposure
  – Model output should be based on near-term / warm sea-surface temperature event set
  – Loss estimate should include:
    • Demand surge
    • Storm surge
    • Fire following earthquakes
    • Secondary uncertainty
    • Loss-adjustment expenses
    • Additional living expenses
Balance Sheet Strength

• Catastrophe PML is used in both standard and stress BCAR

  – Standard BCAR (B8)

  – Stress BCAR

  • Reflection of an insurer’s capitalization shortly after a catastrophic event (B8)
Stress BCAR: Calculation

1. Equity is reduced by the 1:100 year PML

2. Reinsurance recoverables are increased by 40% of the difference in the PML – gross versus net

3. 40% of the 1:100 year PML is added to reserves

4. The net PMLs may be adjusted to reflect changes in reinsurance protection after the first event.
## Stress BCAR: Interpretation

### Baseline (Assumes No Financial Flexibility)

<table>
<thead>
<tr>
<th>Standard BCAR Assessment</th>
<th>Stressed BCAR Tolerance</th>
<th>Revised BCAR Assessment</th>
</tr>
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<tbody>
<tr>
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Stress BCAR: Interpretation

Rating Unit XYZ

(Baseline Interpretation: No Financial Flexibility)

Revised BCAR assessment
“Very Strong”
## Stress BCAR: Interpretation

### Assuming Financial Flexibility

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Stress BCAR: Interpretation

Rating Unit ABC
(Interpretation with Financial Flexibility)

Revised BCAR assessment
“Very Strong”
Terrorism Risk and the Rating Process

- **Balance Sheet Strength**
  - A.M. Best’s assessment of an insurer’s balance sheet strength in light of its terrorism exposure
    - Standard BCAR
    - Stress BCAR
    - Treatment for primary insurers vs. professional reinsurers

- **ERM**
  - How insurers manage their terrorism risk
    - The insurer’s own stress testing
BCAR: How to Calculate the Terrorism PML

- A.M. Best has three tiers that reflect the level of perceived risk of attack for U.S. cities

**Tier 1 (Highest Risk)**
- New York, NY
- Chicago, IL
- Los Angeles, CA
- San Francisco, CA
- Washington, DC

**Tier 2**
- Atlanta, GA
- Baltimore, MD
- Boston, MA
- Buffalo, NY
- Cleveland, OH
- Dallas, TX
- Denver, CO
- Detroit, MI
- Houston, TX
- Las Vegas, NV
- Miami, FL
- Minneapolis/St. Paul, MN
- Newark, NJ
- Orlando, FL
- Philadelphia, PA
- Phoenix, AZ
- San Diego, CA
- San Jose, CA
- Seattle, WA
- St. Louis, MO
- Tampa/St. Petersburg, FL

**Tier 3**
- All Locations Not Listed in Tier 1 or Tier 2

U.S. Locations by Terrorism Risk Tier
1. Assumes a 10% annual probability of a large scale attack (5 to 6 ton TNT truck bomb)

2. Assigns tiers conditional probabilities

<table>
<thead>
<tr>
<th>Tier</th>
<th>Conditional Probability</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>60%</td>
</tr>
<tr>
<td>2</td>
<td>30%</td>
</tr>
<tr>
<td>3</td>
<td>10%</td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
</tr>
</tbody>
</table>

3. Conditional probabilities are converted to annual probabilities: \( \text{Annual Probabilities for Tiers} = 10\% \times \text{Annual Probability} \times \text{Conditional Probability of Each Tier} \)

<table>
<thead>
<tr>
<th>Tier</th>
<th>Annual Probability</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>6%</td>
</tr>
<tr>
<td>2</td>
<td>3%</td>
</tr>
<tr>
<td>3</td>
<td>1%</td>
</tr>
<tr>
<td>Total</td>
<td>10%</td>
</tr>
</tbody>
</table>
BCAR: How to Calculate the Terrorism PML

4. A.M. Best multiplies the annual probability by the number of exposures greater than 10% of surplus (net of reinsurance and TRIPRA) for each tier.

5. The probability calculated for each tier is then multiplied by the largest exposure in each tier to arrive at three terrorism risk amounts.

6. The largest of these three is the terrorism PML.
### BCAR: How to Calculate the Terrorism PML

#### TRIPRA Deductible

<table>
<thead>
<tr>
<th>Tier</th>
<th>TRIPRA Deductible</th>
<th>Largest Net of TRIPRA Exposure</th>
<th>% Geocoded to Street Address</th>
<th>Geocode Surcharge (%)</th>
<th>Surcharge for Exposures Smaller Than Deductible</th>
<th>Surcharge for Exposures Larger Than Deductible</th>
<th>Largest Exposure Adjusted for Geocode % B + E + F</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>$200,000</td>
<td>$305,000</td>
<td>82.5%</td>
<td>10%</td>
<td>$0</td>
<td>$13,500</td>
<td>$318,500</td>
</tr>
<tr>
<td>2</td>
<td>$200,000</td>
<td>$260,000</td>
<td>72.5%</td>
<td>20%</td>
<td>$0</td>
<td>$18,000</td>
<td>$278,000</td>
</tr>
<tr>
<td>3</td>
<td>$200,000</td>
<td>$237,000</td>
<td>62.5%</td>
<td>30%</td>
<td>$0</td>
<td>$20,100</td>
<td>$257,100</td>
</tr>
</tbody>
</table>

#### Annual Conditional Probability

<table>
<thead>
<tr>
<th>Tier</th>
<th>Probability of Large Attack (%)</th>
<th>Probability of Large Attack in Tier (%)</th>
<th>Probability for Each Location (%)</th>
<th># Locations Net of TRIPRA Greater than 10% of PHS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>10%</td>
<td>60%</td>
<td>6%</td>
<td>3</td>
</tr>
<tr>
<td>2</td>
<td>10%</td>
<td>30%</td>
<td>3%</td>
<td>10</td>
</tr>
<tr>
<td>3</td>
<td>10%</td>
<td>10%</td>
<td>1%</td>
<td>80</td>
</tr>
</tbody>
</table>

#### Pretax Terrorism Charge

<table>
<thead>
<tr>
<th>Tier</th>
<th>Locations Times Probability (%)</th>
<th>Pretax Terrorism Charge</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>18%</td>
<td>$57,330</td>
</tr>
<tr>
<td>2</td>
<td>30%</td>
<td>$83,400</td>
</tr>
<tr>
<td>3</td>
<td>80%</td>
<td>$205,680</td>
</tr>
</tbody>
</table>
Standard BCAR: Where to Use Terrorism PML

• Potential Catastrophe Losses
  – At each VAR
    • Compare the terrorism PML to the Nat Cat PML
    • Use the larger as the PML for that VaR
      – \( PML @ \text{VaR } 99 = \text{MAX (Terrorism PML, Nat Cat PML)} \)

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>O</th>
<th>P</th>
<th>Q</th>
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<tbody>
<tr>
<td></td>
<td>VAR 95</td>
<td>VAR 99</td>
<td>VAR 99.5</td>
<td>VAR 99.6</td>
</tr>
<tr>
<td>Maximum Terrorism Charge (Max of Column M)</td>
<td>$205,680</td>
<td>$205,680</td>
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<tr>
<td>Natural CAT PML (Pre-tax)</td>
<td>$100,000</td>
<td>$175,000</td>
<td>$210,000</td>
<td>$275,000</td>
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<tr>
<td>Final PML used in Standard BCAR (Max of Terrorism Charge &amp; NAT CAT PML)</td>
<td></td>
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Stress BCAR: Calculation

• Equity is reduced by the terrorism net post-tax loss

• 40% of the pre-tax ceded terrorism losses are added to recoverables (credit risk)
  – Risk charges for recoverables are based upon the reinsurers’ current financial strength ratings

• 40% of the net pre-tax loss is added to reserves

• The nat cat PMLs are an addition to required capital at each confidence level for the catastrophe risk component
Stress BCAR: Interpretation

- As part of the stress test, companies are subject to three concentration checks

<table>
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<th>Countrywide Concentrations</th>
<th>Tier 1 + Tier 2 Concentrations</th>
<th>Tier 1 Only</th>
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<tr>
<td>Fewer than 10 Areas of Concentrated Pre-Tax Net Losses Greater than 20% of PHS</td>
<td>Fewer than 6 Areas of Concentrated Pre-Tax Net Losses Greater than 20% of PHS</td>
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- Companies must pass all three checks in order to get stress BCAR tolerance
Stress BCAR: Interpretation

- Tolerance assumes insurer has financial flexibility

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Stress BCAR: Passing Example

Revised BCAR Assessment “Very Strong”

- **Check 1 Countrywide**
  - Fewer than 10 Areas of Concentrated Net Losses Greater than 20% of PHS
  - Insurer ABC: 9 Locations
  - PASS

- **Check 2 Tier 1 + Tier 2**
  - Fewer than 6 Areas of Concentrated Net Losses Greater than 20% of PHS
  - Insurer ABC: 5 Locations
  - PASS

- **Check 3 Tier 1**
  - Fewer than 3 Areas of Concentrated Net Losses Greater than 20% of PHS
  - Insurer ABC: 2 Locations
  - PASS

- **Stress BCAR Tolerance**
  - All Concentration Checks Passed
  - Has Financial Flexibility
  - Insurer ABC: Within Tolerance
Stress BCAR: Interpretation

• Analytical review of the insurer and its specific circumstances will determine the final revised BCAR assessment for such an insurer
  – Final revised BCAR will generally be lower than the standard assessment

• What if the insurer has limited financial flexibility?
  – Stress BCAR tolerance is reduced as determined by analytical review of the insurer and its specific circumstances
Stress BCAR: Failing Example

Revised BCAR Assessment
“Strong”
Stress BCAR: Interpretation

• Assuming Financial Flexibility

- Passes All Concentration Checks? (Exhibit B.5)
- Stress BCAR Within Tolerance? (Exhibit B.6)

Yes → Revised BCAR Assessment = Standard BCAR Assessment
No → Revised BCAR Assessment Typically Lower than Standard BCAR Assessment (Analytical Review)