Cambridge Centre for Risk Studies In Collaboration with RMS and Praedicat Workshop 6 September 2017 Best Practices in Scenario Development And Usage: Present and Future

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

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A.M. Best's Rating Methodology

- Balance Sheet Strength
- Operating Performance
- Business Profile
- Enterprise Risk Management





BCAR measures risk adjusted capital adequacy

 Applies stochasticbased risk factors within the model, with factors generated using stochastic simulations from probability curves and ESG



Stress Testing the Balance Sheet via BCAR

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

... but what about Casualty Catastrophes?



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 Construction Defect – Prof. Liab., D&O, E&U, Gen. Casualty, 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



Enterprise Risk Management

Assessment of the overall risk management framework

Assessment of the <u>risk profile</u> of the company relative to its <u>risk management capability</u>

Overall assessment of ERM Use test Performance under stressed environment



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 seasurface 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.



Baseline (Assumes No Financial Flexibility)

| Standard BCAR Assessment | Stressed BCAR Tolerance | Revised BCAR Assessment |
|-----------------------------|----------------------------|----------------------------|
| Strongest | > 10 at 99.6 | = Strongest |
| Very Strong | > 0 at 99.5 | = Very Strong |
| Strong | > 0 at 99 | = Strong |
| Adequate | > 0 at 95 | = Adequate |
| Adequate | ≤ 0 at 95 | = Weak |
| Weak | ≤ 0 at 95 | = Very Weak |



Rating Unit XYZ



(Baseline Interpretation: No Financial Flexibility)



Assuming Financial Flexibility

| Standard BCAR Assessment | Stressed BCAR Tolerance | Revised BCAR Assessment |
|-----------------------------|----------------------------|----------------------------|
| Strongest | > 0 at 99.5 | = Strongest |
| Very Strong | > 0 at 99 | = Very Strong |
| Strong | > 0 at 95 | = Strong |
| Adequate | > 0 at 95 | = Adequate |
| Adequate | ≤ 0 at 95 | = Weak |
| Weak | ≤ 0 at 95 | = Very Weak |





M BES

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



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





- 1. Assumes a 10% annual probability of a large scale attack (5 to 6 ton TNT truck bomb)
- 2. Assigns tiers conditional probabilities

| Tier | Conditional Probability |
|-------|-------------------------|
| 1 | 60% |
| 2 | 30% |
| 3 | 10% |
| Total | 100% |

3. Conditional probabilities are converted to annual probabilities: Annual Probabilities for Tiers = 10% Annual Probability × Conditional Probability of Each Tier

| Tier | Annual Probability |
|-------|--------------------|
| 1 | 6% |
| 2 | 3% |
| 3 | 1% |
| Total | 10% |



- 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



| | А | В | С | D | E | F | G |
|------|------------|-------------|------------|-----------|---------------|---------------|--------------|
| | TRIPRA | Largest Net | % Geocoded | Geocode | Surcharge for | Surcharge for | Largest |
| | Deductible | of TRIPRA | to Street | Surcharge | Exposures | Exposures | Exposure |
| | | Exposure | Address | (%) | Smaller Than | Larger Than | Adjusted for |
| | | | | | Deductible | Deductible | Geocode % |
| Tier | | | | | | | B + E + F |
| 1 | \$200,000 | \$305,000 | 82.5% | 10% | \$0 | \$13,500 | \$318,500 |
| 2 | \$200,000 | \$260,000 | 72.5% | 20% | \$0 | \$18,000 | \$278,000 |
| 3 | \$200,000 | \$237,000 | 62.5% | 30% | \$0 | \$20,100 | \$257,100 |

| | н | 1 | J | к |
|------|---|-----|-------------|---------------|
| | Annual Conditional F Probability of Probability of | | Probability | # Locations |
| | | | for Each | Net of TRIPRA |
| | Large Attack Attack in Tier | | Location | Greater than |
| | (%) | (%) | (%) | 10% of PHS |
| Tier | | | H*I | |
| 1 | 10% | 60% | 6% | 3 |
| 2 | 10% | 30% | 3% | 10 |
| 3 | 10% | 10% | 1% | 80 |

| | L | м | | |
|------|-------------|-----------|--|--|
| | Locations | Pretax | | |
| | Times | Terrorism | | |
| | Probability | Charge | | |
| | (%) | | | |
| Tier | J*K | G * L | | |
| 1 | 18% | \$57,330 | | |
| 2 | 30% | \$83,400 | | |
| 3 | 80% | \$205,680 | | |



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 @ VaR 99 = MAX (Terrorism PML, Nat Cat PML)





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

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

| Countrywide Concentrations | Tier 1 + Tier 2 Concentrations | Tier 1 Only |
|----------------------------|--------------------------------|--------------------------|
| Fewer than 10 Areas of | Fewer than 6 Areas of | Fewer than 3 Areas of |
| Concentrated Pre-Tax Net | Concentrated Pre-Tax Net | Concentrated Pre-Tax Net |
| Losses Greater | Losses Greater | Losses Greater |
| than 20% of PHS | than 20% of PHS | than 20% of PHS |

 Companies must pass all three checks in order to get stress BCAR tolerance



• Tolerance assumes insurer has financial flexibility

| Passes All Concentration Checks | Standard BCAR Assessment | Stressed BCAR Tolerance | Revised BCAR Assessment |
|---------------------------------------|-----------------------------|----------------------------|----------------------------|
| Yes | Strongest | > 0 at 99.5 | = Strongest |
| Yes | Very Strong | > 0 at 99 | = Very Strong |
| Yes | Strong | > 0 at 95 | = Strong |
| Yes | Adequate | > 0 at 95 | = Adequate |
| Yes | Adequate | ≤ 0 at 95 | = Weak |
| Yes | Weak | ≤ 0 at 95 | = Very Weak |



Stress BCAR: Passing Example



Revised BCAR Assessment "Very Strong"

| <u>Check 1</u> Countrywide | | <u>Check 2</u> Tier 1 + Tier 2 | | <u>Check 3</u> Tier 1 | | Stress BCAR Tolerance |
|--|----------|---|---------|---|---------------|---|
| Fewer than 10 Areas of Concentrated Net Losses Greater than 20% of PHS Insurer ABC: 9 Locations | → | Fewer than 6 Areas of Concentrated Net Losses Greater than 20% of PHS Insurer ABC: 5 Locations | | Fewer than 3 Areas of Concentrated Net Losses Greater than 20% of PHS Insurer ABC: 2 Locations | \rightarrow | All Concentration Checks Passed Has Financial Flexibility Insurer ABC: Within Tolerance |
| PASS | | PASS | | PASS | | |



- 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"



Assuming Financial Flexibility





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