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Catastrophe Analysis In A.M. Best Ratings

A.M. Best considers catastrophic loss to be a primary threat to the financial strength and credit quality of property and casualty insurers because of the significant, rapid and unexpected impact that can occur. While many other exposures can affect solvency, no single event can affect policyholder and debt-holder security more instantaneously than catastrophes. Moreover, immediately following a significant event, the company retains its exposure base, and subsequent events can occur prior to the implementation of any risk mitigation strategies.

Given the increased frequency and severity of catastrophic events in recent years, insurers and reinsurers have been challenged to further improve their catastrophe risk management systems and controls, and to provide stronger capitalization to support the risk. Experts in the fields of climatology and meteorology have submitted that global warming is contributing to the unprecedented number of severe events occurring worldwide in recent years, representing a fundamental shift in frequency expectations.

Furthermore, as nations develop, population growth becomes more concentrated in urban and suburban settings, and supply chains increase in complexity. As a result, insurable values are rising rapidly. This is leading to the very real potential for increased severity from both meteorological and seismic events.

Accordingly, A.M. Best continues to assess catastrophe risk management capabilities of primary insurers and reinsurers alike. Regardless of the underlying reasons for changes in the environment, insurers knowingly accept risk with the intent of diversifying the loss, and to maintain their ratings, must demonstrate their ability to effectively manage catastrophe risk and the financial wherewithal to absorb potential losses.

Catastrophe Risk Management: Models and More

The increased frequency and severity of natural catastrophes in has heightened the importance of catastrophe risk management for insurers and reinsurers worldwide.

While most companies modeled their catastrophe exposures in some fashion before these events, there have been many meaningful lessons learned in the past decade about both the quantitative and qualitative elements of measuring and managing catastrophe risk exposure. Not the least of these is the significant variability in model output based on the quality of the data, assumptions used in the models or parameters utilized in running the models.

Since good catastrophe risk management is specific to every company, A.M. Best believes that managements need to be acutely aware of the specific issues that relate to their own geographic exposures and have the ability to properly manage those risks with accurate data. In addition, A.M. Best expects that company managements will be able to articulate their risk tolerance levels, given their importance in the assignment of ratings.

Data Quality

Proper coding of loss exposure is essential to ensure meaningful model output is developed. Key items are quality data, accurately mapped locations, property coding and the models used to assess property

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values. Once the location of the property is collected, property attributes need to be obtained, such as the structure of the building and how many floors there are, what year the building was built, what type of roof the building has and what types of roofs are on the surrounding buildings. Given the sophistication of the many risk management and underwriting tools, A.M. Best strongly believes that all insured properties must be properly coded in all of these key metrics. As additional information improves loss estimates, properly capturing as many secondary modifiers as possible within the model will allow management to more effectively utilize the output in its risk management decisions.

Regardless of the methods used or the approach taken, the information capture has to be as timely as possible to allow for true valuation of the risks at hand. How does management assess the value of a building? What insurance-to-value model and version is used, with special consideration to the age of the parameters that were used in the model? How often are insured values updated, and are the values based on new construction or reconstruction costs?

Capturing the information is one thing, but verifying these data on a timely basis is integral. For primary carriers, site reviews are especially necessary. For instance, what once was a small restaurant might now have outdoor seating with significant upgrades in lighting, landscaping and furniture. Without this updated information, the rate doesn't reflect the potential exposure, putting the insurer at a possible disadvantage.

Safeguards must be implemented to prevent an underwriter or an agent from manipulating the system by miscoding business to get a more favorable classification. Auditing of underwriting information is critical to ensure errors and/or bulk coding are not occurring. These auditing controls and their verification also are important to reinsurers to ensure they are receiving quality information.

The importance that company management places on the quality of the data is a critical factor in the rating assessment. A.M. Best expects higher rated companies to be those that emphasize strong catastrophe management with a superior understanding of and emphasis on quality of underwriting data.

Monitoring Exposures and Controls

Today, most insurers utilize sophisticated catastrophe modeling tools, primarily those provided by specialized firms with extensive meteorological, seismological, statistical and technological resources to provide loss estimates. The models depend on the veracity of the data input, subject to manipulation through the use of various options that can add to or reduce the net probable maximum loss (PML).

While catastrophe models are extraordinarily useful in the analytical and underwriting process, they are only tools and cannot be solely relied upon for the management of maximum exposures. A.M. Best believes the catastrophe models are valuable tools in monitoring an estimated distribution of potential catastrophe losses, and will continue to utilize modeled output in its evaluation of capitalization through Best's Capital Adequacy Ratio (BCAR). However, A.M. Best also believes that careful monitoring of zonal and other specific aggregates, including "what-if" scenario testing using severe events in areas with concentrated exposures, is critical to understanding maximum potential loss and is a critical component of strong catastrophe risk management.

In using any catastrophe model, after ensuring quality data are entered, the user must be concerned with the parameters of the model. In using models to assess catastrophe loss exposure, there are many model options that can be set at varying levels of conservatism. A.M. Best expects companies to be realistic in their use of these tools. Demand surge, storm surge, loss-adjustment expenses and additional living expenses historically have contributed to

losses and are expected to be included in any loss estimate. Depending on what coverages are underwritten, fire following earthquake, property structure and contents, business income, workers' compensation, ocean and inland marine, energy, flood, auto physical damage and crop losses also are expected to be included. An additional estimate should be considered for any unmodeled losses such as assessments from guaranty funds, involuntary pools, etc. In addition, model output should be based on the "near-term"/warm sea-surface temperature (WSST) event set. If this information is excluded, A.M. Best analysts will make conservative assumptions that would impact their view of the company's risk-adjusted capitalization.

Since there are several viable specialized tools available for modeling catastrophes, there is a range of perspectives on a company's loss exposure. Determining which tool to use in assessing catastrophe exposure will require an understanding of the differences specific to each modeling tool, as well as the risks unique to the insurer. A.M. Best expects that a company's management will be able to explain why it has utilized the output selected to best represent its catastrophe exposure. This would be true in the case of companies utilizing multiple models, but also true for those companies that have chosen to use only one model to assess their exposure and/or have recently changed which model they rely on to produce their estimates. A.M. Best expects those companies with strong risk management to have considered the quality of the models they are using, as well as other techniques to monitor exposure within their catastrophe management programs.

A.M. Best believes those companies that utilize models to merely manage to the lowest-case loss estimates, rather than realistic loss scenarios, have demonstrated weakness in business practices that will be reflected in their ratings, regardless of apparent capitalization. A.M. Best expects those companies that are considered strong risk managers to also review aggregate loss-exposure accumulation. Aggregate loss exposure should be used in scenario testing as a secondary test of the catastrophe modeling tools. Specific zonal aggregate exposure limits need to be established using a reasonable and defensible basis. Are limits based on actual loss events, or are they the result of robust scenario testing? A company may have "dodged the bullet" for one event, but that doesn't mean that it will miss a similar event the next year. Companies need to consider potential scenarios in addition to model output to ensure they are not overexposed to unforeseen events. While zonal aggregate limits are a useful tool in managing catastrophe exposure, they have their weaknesses. One such limitation is that at an aggregate level, individual risk underwriting is ignored. A better risk is treated the same as a poor risk. Still, zonal aggregate limits can be valuable.

The final key to strong catastrophe risk management is the integration of the monitoring of exposure into the underwriting process. Are exposure data integrated directly into the underwriting process, and do underwriting decisions include the latest aggregate exposure position? For those companies with material catastrophe exposure, the management of that exposure should be a continual process, not just an annual run of catastrophe models.

Catastrophe risk management is evaluated relative to these standards and considered along with the financial flexibility of a company to determine its ability to first, avoid a material loss to capital, and second, respond to any significant capital deterioration from such an event. Those companies that have demonstrated strength in both of these areas will be afforded the greatest amount of flexibility within A.M. Best's stress test of catastrophe exposure.

Catastrophe Risk: Treatment in BCAR

As mentioned above, A.M. Best believes that catastrophe models are valuable tools and will continue to utilize modeled output in its evaluation of capitalization through BCAR. As part of this process, analysts gather information through A.M. Best's Supplemental Rating

Questionnaire (SRQ) or other similar requests regarding which items and parameters are included in the company-provided modeled output. As indicated, A.M. Best requires the options for demand surge, storm surge, fire following earthquakes, secondary uncertainty and the “near-term” event set to be selected for inclusion in the loss estimates. Material sources of catastrophe risk, such as property structure and contents, additional living expenses, business interruption, flood, auto/motor physical damage, workers’ comp, energy, ocean and inland marine, crop and unmodeled losses such as loss adjustment expenses also are required to be included in the loss estimate. These requirements enhance the standardization of the assumptions underlying the PMLs utilized in A.M. Best’s determination of capital requirements. If these items are not included in the PML estimate, the expected loss estimate will be increased by a conservative margin for inclusion in the BCAR. A.M. Best analysts also review aggregate insured value data by territory and engage management in discussions regarding maximum exposure and risk appetite. Where modeled data are unavailable, the aggregate zonal information is necessary to develop an appropriate stress test.

For companies with natural catastrophe exposure from property or workers’ comp business, A.M. Best includes a reduction to surplus in its calculation of a company’s standard BCAR score, which is published in its company report. The baseline treatment in BCAR is to reduce surplus using the larger of a 1-in-100-year per occurrence hurricane/windstorm PML, a 1-in-250-year per occurrence random time earthquake PML, or a recent actual large loss, net of reinsurance and of a 35% tax rate. The PML should be based on world wide exposures, not regional exposures. The analyst may increase the loss estimate to reflect a more severe event in cases where the modeled loss estimate appears to be inconsistent with overall exposures.

While BCAR focuses on the estimated net exposure to a 1-in-100-year hurricane/windstorm and a 1-in-250-year earthquake, the level of reinsurance protection purchased by a company also is reviewed. A.M. Best expects that company management will explain their level of risk tolerance in establishing the amount of reinsurance protection purchased. The amount of protection purchased beyond the exposure included in A.M. Best’s capital model is considered in the overall assessment of a company’s capital position. Analysts look beyond a specific number to consider the volatility in the output to determine the true risk in the capitalization. In theory, if an insurer prudently manages its risk accumulations and is conservative in its appetite for surplus or earnings exposure, it should be able to withstand a reasonably severe event without a change to its ratings.

When companies provide output from multiple catastrophe models, A.M. Best’s baseline approach is to take the straight average. This, however, can be adjusted to a weighted average in cases where more refined information is available that supports greater reliance being placed on a given model. In either case, A.M. Best expects a company’s management to be able to explain why it has utilized the output selected to best represent its catastrophe exposure.

Natural Catastrophe Stress Test

In addition to requiring a company to maintain capitalization that can withstand the net after-tax impact to surplus from a severe event, A.M. Best analysts perform a further stress test on the capitalization. To reflect the notion that the company’s net exposure is similar after an event and that the organization remains exposed to additional events, a second net after-tax loss is included. This should not be interpreted as A.M. Best requiring a company to withstand two major events but instead is intended to be a reasonable reflection of the stressed risk profile shortly after a catastrophic event.

As the stress test reflects the financial condition following an event, A.M. Best may allow the stress-tested score to fall below the guidelines. This tolerance is intended to reflect the

expectation that improvement will occur as reinsurance recoverables and reserves are reduced and, in some cases, capital restored. As discussed later, the level of deterioration allowed from a standard risk-adjusted capital level to a stress-tested level will be based on a number of quantitative and qualitative factors.

BCAR Stress Test

The following calculations are completed in the BCAR model for the natural catastrophe stress test:

- 1) The after-tax net per-occurrence probable maximum loss (PML) of the first event, including retention, co-participation and reinstatement premiums on catastrophe reinsurance contracts, is subtracted from surplus.
- 2) Reinsurance recoverables are increased by 40%** of the difference between the gross and net pretax loss and LAE (retention and co-participation) of the first event.
- 3) 40% of the net pretax loss and LAE (retention and co-participation) of the first event is added to existing reserves to capture the potential for adverse development. Companies protected from any adverse development would not require this adjustment.
- 4) The after-tax net PML (retention, co-participation and reinstatements) for an additional event is deducted from risk-adjusted surplus.
- 5) The PML used for the second event is the same as for the first event where hurricanes/windstorms are the major risk, as the occurrence of a major hurricane/windstorm has no influence on the potential severity of subsequent events. Where earthquakes are the major exposure, the second event is reduced to a 1-in-100 year loss, given the lower probability of a second major earthquake following the first event in the same year.

Capital Adequacy Levels

A.M. Best's published BCAR guidelines for financial strength ratings are shown in **Exhibit 1**. To be considered for a particular rating level, an insurer's standard (non stress-tested) BCAR generally must meet or exceed the guidelines for that rating level. However, if an entity has a volatile operating history, a weak business profile or poor risk management, the standard BCAR must be maintained substantially higher than the indicated guidelines for the given rating level.

Since the stress test is intended to represent a company's financial position shortly after a catastrophe event, and in theory risk-adjusted capitalization should recover over the intermediate term, the stress-tested BCAR score can fall to a maximum of 30 points below these published guidelines. The level of tolerance will be based on A.M. Best's assessment of a number of factors.

Key among the factors regarding A.M. Best's tolerance is the organization's perceived financial flexibility. Companies that are able and willing to replace lost capital immediately following an event will be afforded greater leeway with regard to the disparity in the standard BCAR and the natural catastrophe stress test. The source and type of funds available will play an important part in this determination. The capital markets' willingness to provide the necessary funding also will be considered and will vary depending on

Exhibit 1 BCAR Guidelines

BCAR	Implied Balance Sheet Strength
175	A++
160	A+
145	A
130	A-
115	B++
100	B+
90	B
80	B-
70	C++
60	C+
50	C
40	C-
<40	D

market conditions. An assessment of financial flexibility also will include parent and subsidiary relationships and will incorporate A.M. Best's expectation of the level of commitment to the catastrophe-exposed subsidiary on both a current and a prospective basis.

In the event that debt is issued to facilitate the replenishment of capital, the holding company analysis will be updated to assess the impact on financial leverage and coverage ratios.

A second key factor regarding the level of decline in the stress-tested scenario is an assessment of historical volatility in terms of both the balance sheet and operating performance. Companies with significant volatility in results will be afforded less tolerance in A.M. Best's view, as replenishing capital through earnings could prove difficult. Conversely, companies with consistently stable results and proven track records of favorable earnings and corresponding growth in surplus will be afforded greater tolerance in the stress-test scenario.

Another important consideration is a company's exposure to multiple events in a season. This exposure to frequency applies to both hurricane and tornado/hail exposed regions. Those with exposure to more frequent severe events will be afforded less tolerance in the application of the stress test. An accumulation of losses associated with multiple events is an important consideration, particularly as it applies to net retention levels relative to surplus. A high frequency of events combined with even a modest net retention potentially could generate a significant accumulation of losses. Accordingly, the ability to absorb subsequent events could become a rating issue, leading to less tolerance relative to capital requirements.

A.M. Best considers the overall level of catastrophe exposure relative to surplus as part of the stress test application. Those companies that have relatively high catastrophe exposure, either gross or net of reinsurance, likely will have higher capital requirements, given the inherent

Exhibit 2 Hypothetical Company Comparison

	Company A	Company B	Company C	Company D
Profile	Personal Auto/Homeowners in Several Midwestern States	Personal/Commercial Auto, Homeowners & Small Commercial in Western U.S.	Start-Up Primary Property Along Gulf Coast	Start-Up Commercial & Primary Property in Southeast U.S.
Standard BCAR	170	145	180	300
Stressed BCAR	135	104	130	185
Financial Flexibility	Limited	Strong	Average	Average
Historical Volatility (Balance Sheet & Operating Performance)	Yes	No	Not Applicable	Not Applicable
Frequency Exposure	Yes	No	Yes	Yes
Primary Cat Exposure	Tornado	Earthquake	Hurricane	Hurricane
Catastrophe Exposure to Surplus	Modest Gross & Net Exposure	High Gross, Low Net	High Gross, Modest Net	High Gross, Low Net
Catastrophe Risk Management Capabilities	Average (somewhat concentrated)	Above Average (geographic spread, diversification by line)	Average but untested (concentrated exposures but adequate reinsurance program)	Average but untested (concentrated exposures, adequate reinsurance program, management history in region & lines of business)
	Annual catastrophe model runs	Models and aggregate exposure used in underwriting process		
	Minimal data verification	Data verification process used		
Maximum Allowance in Stress Test (Below Guideline)	0 points	30 points	N/A – margin required until catastrophe management process in place	N/A – margin required until catastrophe management process in place
Resulting FSR	A- Stable	A- Stable	B++ Stable	A- Stable

risks associated with elevated dependence on reinsurance and greater exposure to credit risk.

Underlying all these factors is A.M. Best's assessment of each company's catastrophe risk management capabilities. As noted, A.M. Best believes companies that possess strong catastrophe risk management continually focus on data quality, regularly monitor exposures and have specific controls in place to manage their exposures on an ongoing basis. Accordingly, companies that have these characteristics likely will mitigate the overall loss associated with severe events and avoid material declines in risk-adjusted capitalization.

As indicated, the level of tolerance regarding the decline under the stress test will be based on a qualitative assessment of these factors and will be determined via the rating committee process, as there is no one BCAR score that equates to a given rating level for all companies. While the stressed scenario for some companies may fall below the guidelines, for others this evaluation may result in no allowance relative to the guidelines. Via the rating committee process, the interplay of risk-adjusted capitalization, operating performance and business profile ultimately determines the rating.

Conclusion

A.M. Best continues to believe that understanding each entity's financial condition after a catastrophe, as well as its ongoing ability to respond to subsequent events, is a critical component of the rating assignment. In addition, each company's catastrophe management capabilities and level of data quality play an extremely important role in the assessment of capital required to offset catastrophe risk. Accordingly, A.M. Best will continue to put significant emphasis on catastrophe risk management, using both the standard and stress-tested view of risk-adjusted capitalization.

Note: All information on the stress test and assumptions can be shared with management on request. Published BCAR scores do not include stress tests.

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