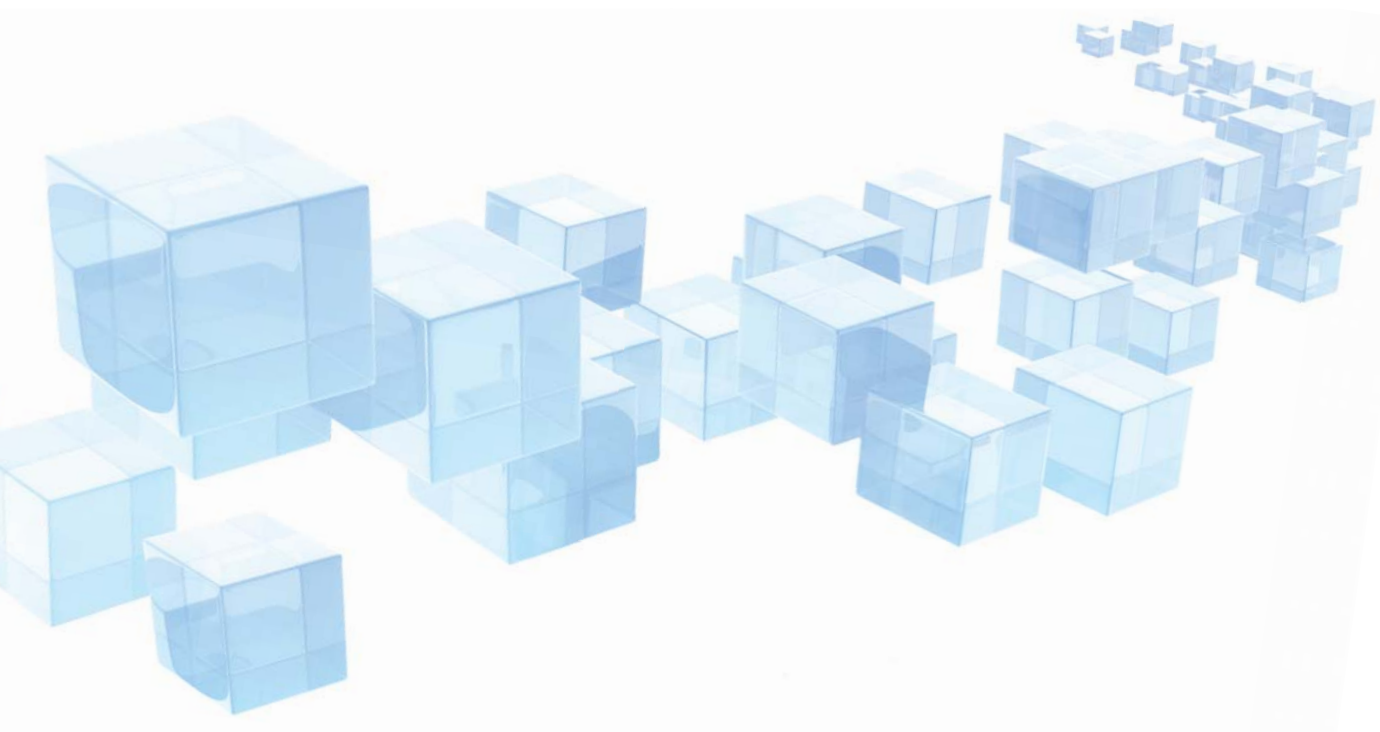


Catastrophe Analysis in A.M. Best Ratings

October 13, 2017



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Outline

- A. Market Overview
- B. Enterprise Risk Management (ERM)
- C. Balance Sheet Strength

The following criteria procedure should be read in conjunction with *Best's Credit Rating Methodology (BCRM)* and all other related BCRM-associated criteria procedures. The BCRM provides a comprehensive explanation of A.M. Best Rating Services' rating process.

A. Market Overview

A.M. Best considers catastrophic loss to be a severe threat to the balance sheet strength of property and casualty insurers because of the potentially significant, rapid, and unexpected impact. No other single event can affect policyholder and/or debt-holder security more quickly than catastrophes. The danger associated with catastrophes is amplified as, immediately following a significant event, a company remains exposed to further events, which can occur prior to the implementation of any risk mitigation strategies.

A.M. Best expects insurers accepting catastrophe risk to be able to demonstrate that they (1) can effectively manage catastrophe risk and (2) have the financial wherewithal to absorb potential losses. Accordingly, an insurer's catastrophe risk impacts two of the building blocks in the rating process. The quality of an insurer's catastrophe stress testing program influences the enterprise risk management (ERM) assessment, while the balance sheet strength assessment incorporates an evaluation of an insurer's financial capability in light of an event.

B. Enterprise Risk Management (ERM)

ERM Framework Evaluation: Catastrophe Risk Management (Stress Testing)

One of the components of A.M. Best's ERM framework evaluation is stress testing. Appropriate catastrophe risk management is specific to every company; therefore, A.M. Best believes that management (1) needs to be acutely aware of issues specific to the company's individual geographic exposures and (2) should be able to properly manage those risks with accurate data. A.M. Best thus scrutinizes both the quality of the data an insurer uses for its stress testing and the tools it uses to monitor its exposure.

A.M. Best expects companies to emphasize data quality in their stress testing, while understanding and accounting for the limitations of their modeling tools. Companies should also consider the quality of the models they use, as well as other techniques to monitor exposure in their catastrophe management programs. Companies that manage merely to lowest-case loss estimates, rather than realistic loss scenarios, have demonstrated weakness in business practices that will be reflected in the assessment.



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Catastrophe Modeling

Most insurers use sophisticated catastrophe modeling tools, provided primarily by specialized firms with extensive meteorological, seismological, statistical, and technological resources. These models depend on the veracity of the data input, which is subject to manipulation through the use of options that can raise or lower the net probable maximum loss (PML).

Catastrophe models are extraordinarily useful in the analytical and underwriting process, but they are only tools and cannot be solely relied upon for the management of maximum exposures. Careful monitoring of zonal and other specific aggregates, including what-if scenario testing using severe events in areas with concentrated exposures, is crucial to understanding maximum potential loss and managing catastrophe risk.

A model's parameters are also critical to successful catastrophe risk management. Many model options can be set at varying levels of conservatism; companies should therefore be realistic in using these tools. Demand surge, storm surge, loss-adjustment expenses, and additional living expenses should be included in any loss estimate. Depending on what coverages are underwritten, models should also take into account losses related to fire following earthquake, property structures and contents, business income, workers' compensation, ocean and inland marine, energy, flood, auto physical damage, and crops. An additional estimate should be considered for any unmodeled losses, such as assessments from guaranty funds, involuntary pools, etc. Model output should be based on the near-term/warm sea-surface temperature (WSST) event set. If this information is excluded, analysts will make conservative assumptions, which will affect A.M. Best's view of the company's risk-adjusted capitalization.

The availability of several specialized tools for modeling catastrophes allows for a range of perspectives on a company's loss exposure. Determining which tool to use to assess catastrophe exposure requires an understanding of the differences of each modeling tool and of the risks unique to the insurer. A company, regardless of the number of models it uses, should be able to explain why the output selected best captures its catastrophe exposure.

Data Quality

Developing meaningful model output requires proper coding of loss exposure—key items are data quality, the accuracy of mapped locations, property coding, and the models used to assess property values. Once the location of the property is collected, property attributes need to be obtained. These include the structure of a building and the number of floors, the year it was built, the type of roof it has, and the types of roofs on surrounding buildings. A.M. Best strongly believes that an accurate measurement of loss exposure requires proper coding of all of these key metrics. Since additional information improves loss estimates, properly capturing as many secondary modifiers as possible in the model will enhance a company's ability to make more effective risk management decisions.

Regardless of the methods used or the approach taken, the data used need to be as timely as possible to allow for a true valuation of the risks at hand. Moreover, verifying these data on a timely basis is

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integral. For primary carriers, site reviews are especially necessary, because of potential changes to insured properties—for instance, what was once a small restaurant might now have outdoor seating with significant upgrades in lighting, landscaping, and furniture. Without this updated information, the policyholder’s rate may not accurately reflect the insurer’s potential exposure.

Safeguards must be implemented to prevent an underwriter or an agent from manipulating the system by miscoding business for a more favorable classification. Audits of underwriting information to prevent errors and/or bulk coding are critical.

Aggregate Loss Exposure

Aggregate loss exposure should be used in scenario testing as a secondary test of the catastrophe modeling tools. Specific, reasonable, and defensible zonal aggregate exposure limits need to be established. An analyst may discuss with the company whether its limits are based on actual loss events or on the results of robust scenario testing. Companies also need to consider potential unmodeled scenarios in addition to model output to ensure they are not overexposed to unforeseen events.

Zonal aggregate limits are a useful tool in managing catastrophe exposure but have their weaknesses. One such limitation is that, at an aggregate level, individual risk underwriting is ignored—in other words, a better risk is treated the same as a worse risk. Insurers that more effectively manage their catastrophe risk use aggregate loss exposure analysis to enhance rather than replace modeled results.

Monitoring

The final key element of strong catastrophe risk management is the integration of exposure monitoring into the underwriting process. For those companies with material catastrophe exposure, exposure management should be a continual process, not just an annual run of catastrophe models.

C. Balance Sheet Strength

Treatment in BCAR

A.M. Best believes that catastrophe models are valuable tools for monitoring an estimated distribution of potential catastrophe losses, and uses company-provided modeled output in its evaluation of capitalization through the Best’s Capital Adequacy Ratio (BCAR). This information is collected through A.M. Best’s Supplemental Rating Questionnaire (SRQ) or other similar requests on the items and parameters in the modeled output.

A.M. Best requires options for demand surge, storm surge, fire following earthquakes, secondary uncertainty, and the near-term event set to be included in the loss estimates. The loss estimate must also include material sources of catastrophe risk—for example, property structure and contents, additional living expenses, business interruption, flood, auto/motor physical damage, workers’ compensation, energy, ocean and inland marine, crop, and unmodeled losses such as loss adjustment expenses. These requirements enhance the standardization of the assumptions underlying the PMLs used in the BCAR model. If these items are not included in the PML estimate, analysts will increase

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the expected loss estimate 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 about maximum exposure and risk appetite. If modeled data are unavailable, the aggregate zonal information is necessary to develop an appropriate stress test.

Natural Catastrophe Stress Test

In addition to requiring that a company maintain capitalization that can withstand its modeled catastrophe losses, A.M. Best analysts conduct a stress test on capitalization. To reflect the assumption that the company's net exposure essentially remains the same after an event and that the organization remains exposed to further events, the original net pre-tax PMLs will remain in the stressed BCAR (as described below). This should not be interpreted as A.M. Best requiring that a company withstand two major events, but is instead intended to be a reasonable reflection of a stressed risk profile shortly after a catastrophic event.

BCAR Stress Test

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

1. The reported surplus is reduced by the 1-in-100-year net post-tax PML (including reinstatement premium) from the per-occurrence all-perils combined information.
2. Reinsurance recoverables are increased a minimum of 40% of the difference in the 1-in-100-year gross and net pre-tax per occurrence all-perils combined PML (excluding reinstatement premiums). This adjustment can also increase the reinsurance dependence factor. In determining the appropriate risk charge for these recoverables, A.M. Best assumes the ratings on the reinsurers will remain unchanged as a result of the event.
3. An amount equal to 40% of the 1-in-100-year per-occurrence all-perils combined net pre-tax PML (excluding reinstatement premiums) is added to the loss reserves. This amount may be adjusted based on the reinsurance structure (i.e., caps, co-participation, etc.).
4. If necessary, the net pre-tax PMLs (including reinstatement premiums) used at each confidence level for the catastrophe risk (B8) may be adjusted to reflect any changes in the net PMLs owing to changes in the reinsurance structure in place after the first event occurs.

Note: The reduction to surplus in Step 1 is on a post-tax basis only if the analyst believes that the company will be able to use the tax benefit. Otherwise, the calculation is on a pre-tax basis.

Capital Adequacy Levels

A rating unit's stressed BCAR results affect its revised BCAR assessment, which is one component of the overall balance sheet strength assessment. **Exhibit C.1** details a reasonable guide to standard BCAR scores and their associated assessments.

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Exhibit C.1: BCAR Assessments

VaR Confidence Level (%)	BCAR	BCAR Assessment
99.6	> 25 at 99.6	Strongest
99.6	> 10 at 99.6 & ≤ 25 at 99.6	Very Strong
99.5	> 0 at 99.5 & ≤ 10 at 99.6	Strong
99	> 0 at 99 & ≤ 0 at 99.5	Adequate
95	> 0 at 95 & ≤ 0 at 99	Weak
95	≤ 0 at 95	Very Weak

After calculating a rating unit's standard and stressed BCARs, A.M. Best compares the two. As a starting point, the interpretation of the stressed BCAR results will typically follow the path outlined in **Exhibit C.2**.

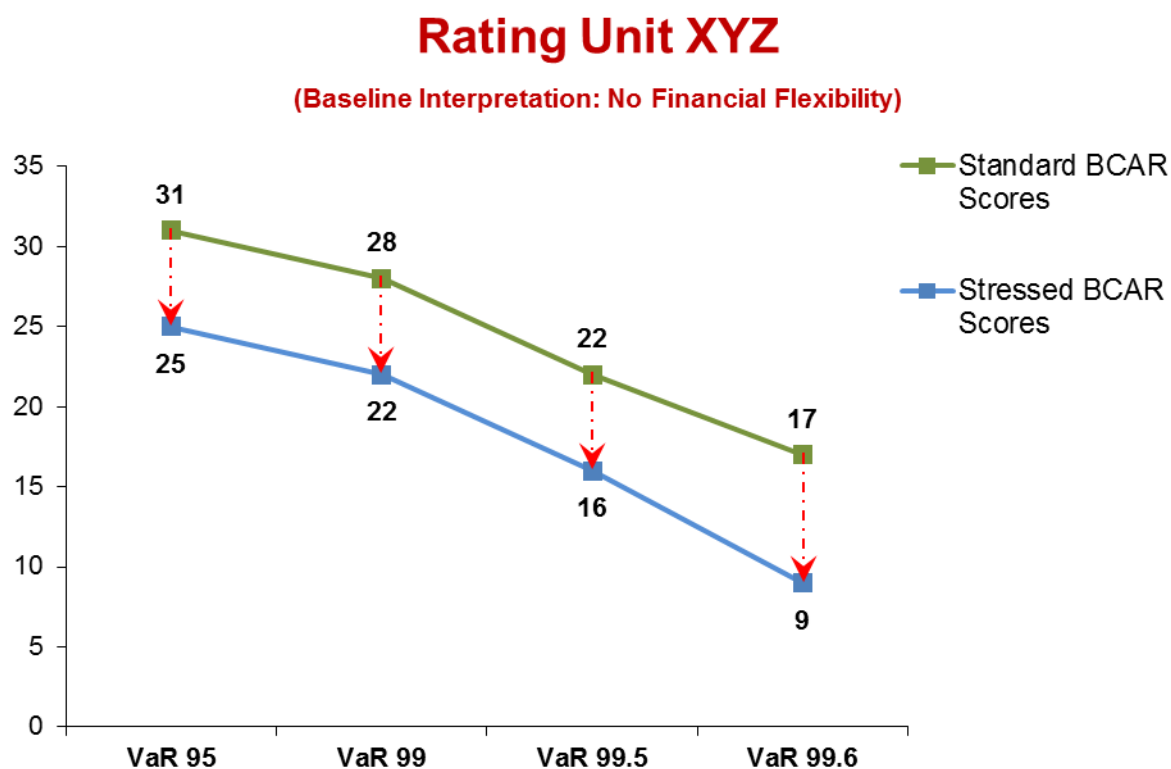
Exhibit C.2: Baseline Interpretation of BCAR Results

Standard BCAR Assessment	Stressed BCAR Tolerance	Revised BCAR Assessment
Strongest > 25 at 99.6	> 10 at 99.6	= Strongest
Very Strong > 10 at 99.6 & ≤ 25 at 99.6	> 0 at 99.5	= Very Strong
Strong > 0 at 99.5 & ≤ 10 at 99.6	> 0 at 99	= Strong
Adequate > 0 at 99 & ≤ 0 at 99.5	> 0 at 95	= Adequate
Adequate > 0 at 99 & ≤ 0 at 99.5	≤ 0 at 95	= Weak
Weak > 0 at 95 & ≤ 0 at 99	≤ 0 at 95	= Very Weak

Exhibit C.3 shows the baseline interpretation for fictional rating unit XYZ. XYZ's BCAR score is 17 at the 99.6 VaR, resulting in a standard BCAR assessment of "Very Strong." The stressed BCAR scores are positive across all VaR levels, scoring 9 at the 99.6 VaR, resulting in a stressed BCAR assessment of "Strong." Thus, A.M. Best would typically consider XYZ's revised BCAR assessment to be "Very Strong." As noted, BCAR is just one of many factors considered in the balance sheet strength assessment, and XYZ's balance sheet strength assessment could differ from its BCAR assessment.

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Exhibit C.3: Stressed BCAR Interpretation – Example



As discussed in the following section, **Exhibits C.2** and **C.3** illustrate only the baseline interpretation of stressed BCAR results. A.M. Best may have greater tolerance for more significant drops between the standard BCAR and the stressed BCAR scores depending on the rating unit's financial flexibility.

The revised BCAR assessment of a rating unit that exceeds the stress tolerances in **Exhibits C.2** (baseline) and/or **C.4** (tolerances for those insurers with financial flexibility) will generally be lower than the standard assessment.

Financial Flexibility and Other Adjustments

An organization's financial flexibility can affect the interpretation of the stress test. When reviewing the disparity between the standard BCAR and the stressed BCAR, A.M. Best may view companies that are able and willing to replace lost capital immediately following an event more positively and allow increased stressed BCAR tolerance (**Exhibit C.4**).

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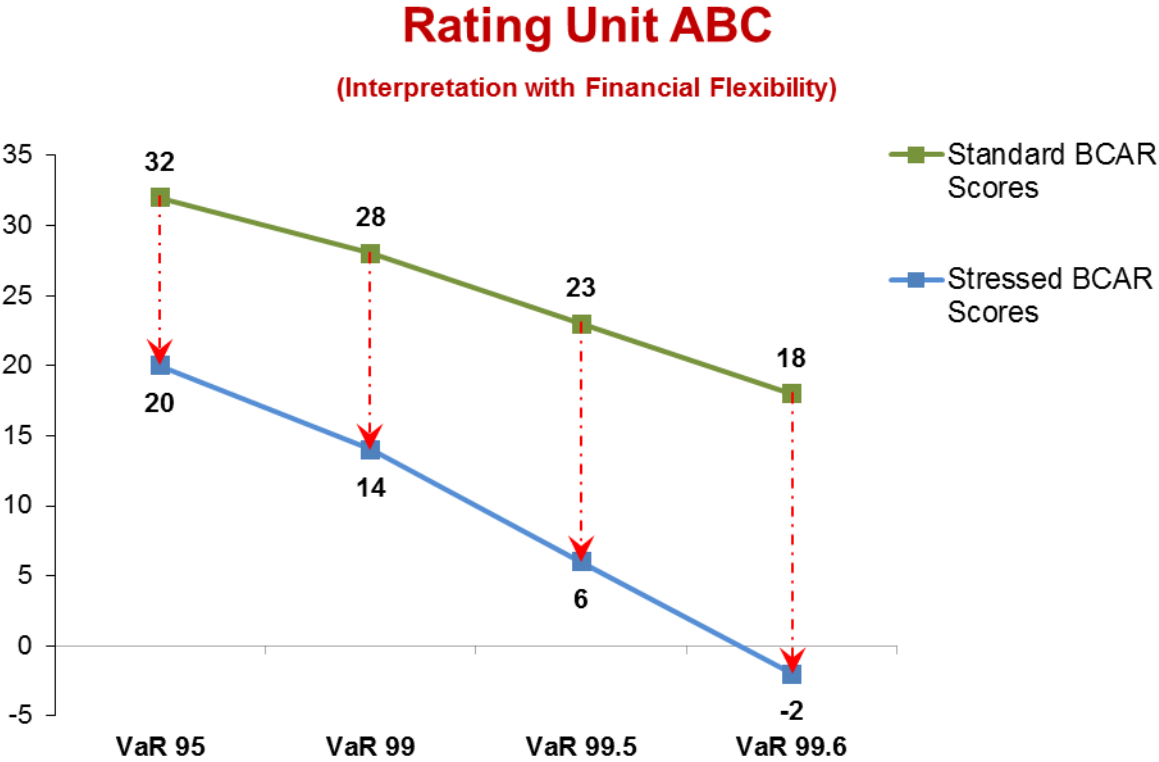
Exhibit C.4: Interpretation of BCAR Results for Rating Units with Financial Flexibility

Standard BCAR Assessment	Stressed BCAR Tolerance	Revised BCAR Assessment
Strongest > 25 at 99.6	> 0 at 99.5	= Strongest
Very Strong > 10 at 99.6 & ≤ 25 at 99.6	> 0 at 99	= Very Strong
Strong > 0 at 99.5 & ≤ 10 at 99.6	> 0 at 95	= Strong
Adequate > 0 at 99 & ≤ 0 at 99.5	> 0 at 95	= Adequate
Adequate > 0 at 99 & ≤ 0 at 99.5	≤ 0 at 95	= Weak
Weak > 0 at 95 & ≤ 0 at 99	≤ 0 at 95	= Very Weak

The hypothetical scores of ABC in **Exhibit C.5** illustrate the effect of higher tolerance. ABC's standard BCAR assessment is again "Very Strong." However, its stressed BCAR assessment is merely "Strong" (positive at VaR 99.5 and negative at VaR 99.6). Since ABC has financial flexibility, A.M. Best may conclude that ABC's stress results are still appropriate for an overall BCAR assessment of "Very Strong."

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Exhibit C.5: Example of Interpretation with Financial Flexibility



The source and type of funds available plays an important part in determining whether a rating unit has financial flexibility. The capital markets’ willingness to provide the necessary funding, which depends on market conditions, is also considered. The assessment of financial flexibility thus includes an examination of parent and subsidiary relationships and incorporates A.M. Best’s expectation of the level of commitment—both current and prospective—to the catastrophe-exposed subsidiary.

The level of decline in the stress test assessment is viewed in the context of the historical volatility of both the balance sheet and operating performance. Companies with significantly volatile results will be viewed more cautiously in the stress test assessment, given that replenishing capital through earnings could prove difficult. Conversely, companies with consistently stable results, a favorable earnings history, and corresponding growth in surplus will be afforded greater qualitative credit in the stress test assessment.

Another important consideration is a company’s exposure to multiple events in a season. This exposure to frequency applies to both regions exposed to hurricanes and tornados/hail. Those with exposure to more frequent severe events will be viewed more cautiously in the stress test assessment. An accumulation of losses associated with multiple events is an important consideration, particularly with regard to net retention levels relative to surplus. A high frequency of events, combined with even modest net retention, could incur significant losses. Accordingly, the inability to

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absorb subsequent events could negatively affect the balance sheet strength assessment. A.M. Best considers the overall level of catastrophe exposure relative to surplus as part of the stress test assessment. In both the standard and stressed BCAR assessments, capital requirements for those companies with a relatively high catastrophe exposure (either gross or net of reinsurance) are likely to be higher, given the inherent risks associated with an elevated dependence on reinsurance and greater exposure to credit risk.

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A.M. Best Rating Services, Inc.
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CHAIRMAN & PRESIDENT Larry G. Mayewski
EXECUTIVE VICE PRESIDENT Matthew C. Mosher
SENIOR MANAGING DIRECTORS Douglas A. Collett, Edward H. Easop,
Stefan W. Holzberger, James F. Snee

WORLD HEADQUARTERS
1 Ambest Road,
Oldwick, NJ 08858
Phone: +1 908 439 2200

MEXICO CITY
Paseo de la Reforma 412,
Piso 23,
Mexico City, Mexico
Phone: +52 55 1102 2720

LONDON
12 Arthur Street, 6th Floor,
London, UK EC4R 9AB
Phone: +44 20 7626 6264

DUBAI*
Office 102, Tower 2,
Currency House, DIFC
P.O. Box 506617,
Dubai, UAE
Phone: +971 4375 2780

*Regulated by the DFSA as a Representative Office

HONG KONG
Unit 4004 Central Plaza,
18 Harbour Road,
Wanchai, Hong Kong
Phone: +852 2827 3400

SINGAPORE
6 Battery Road,
#40-02B,
Singapore
Phone: +65 6589 8400



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