IBM Algo Risk Service on Cloud

IBM Algo Risk Service Custom Scenario on Cloud

Overview

IBM® Algo Risk Service Custom Scenario on Cloud offers clients the capability to create, implement and update scenarios tailored to their specific risk profiles and changing market conditions, supported by IBM professionals. Algo Risk Service Custom Scenario on Cloud, available to subscribers to the interactive Algo Risk Application and/or the standalone IBM® Algo Risk Service Advanced Reporting on Cloud, represents a sophisticated, customized enhancement of the standard scenarios available in the Algo Risk Service on Cloud.

Scenarios are the fundamental building blocks of any risk management framework. Each scenario has assumptions about the movements of market risk factors. These assumptions can be defined in absolute terms (e.g., as sensitivities or stress tests) or estimated by a series of statistical processes (e.g., Monte Carlo scenarios) to achieve the best available forecast of future market conditions. Algo Risk Service on Cloud provides a broad set of standard, sophisticated scenarios that are designed to cater to the needs of most clients. These scenarios provide, for example, a measure of sensitivity to a broad ranges of risk factors, simulate the portfolios through time and through a range of Monte Carlo scenarios, and demonstrate how the portfolio would react to real historical or to hypothetical market events.

This extension enhances the scenario universe for clients of the Algo Risk Service on Cloud, enabling them to gain an even closer match to their specific investment strategies and risk profiles. IBM analysts will assist clients in understanding the various scenario options available, and will gather the requirements for implementation in the client's unique environment. The advanced scenarios will then be available to the client as additional selections or reports in the Algo Risk Application, and/or in their Algo Risk Service Advanced Reporting on Cloud packages.

Types of custom scenarios

This extension enables scenario creation and analysis under two broad categories, depending on the specific requirements of each client:

1. Stress test scenarios, or different forms of user-defined scenarios, can be dictated by the client or developed jointly with IBM professionals. Diverse client requirements are supported by scenarios covering a wide spectrum of possibilities.

2. Statistical scenarios, historical or Monte Carlo, are typically used by clients for Value at Risk (VaR). These scenarios are developed with a flexible and sophisticated functionality.

Monte Carlo scenarios

In the Algo Risk Service on Cloud implementation phase, minor modifications to the standard Monte Carlo scenarios, such as changes in the Variance-Co-Variance (VcV) estimation decay factor, the sampling frequency, the scenario generation model, or slight extensions of the observation window, are generally performed as part of the overall Algo Risk Service on Cloud.

The extension covers more material changes that typically increase the scenario generation and instrument computation workload. Examples include:

- Generating multiple scenario sets, each with a different set of scenario parameters (for example, observation window, decay factor, observation frequency and scenario generation process), in order to compare sensitivity of risk measurements to those parameters. Another example is allowing only particular types of risk factors to fluctuate in each scenario set so that the risk arising from these risk factors can be determined in isolation (split VaR).
- Increasing the number of scenarios, to provide better resolution across the distribution so that the accuracy at the tails of the distribution can be enhanced.
- Increasing the number of time steps, to allow risk to be measured at more frequent, or more distant, times in the future.

- Lengthening (considerably) the observation window since co-dependency structure is based on a longer history.
- Customizing elements of the scenario generation process; for example, incorporating an alternative VcV matrix provided by the client to include assumptions on future volatilities and correlations.

Historical scenarios

Algo Risk Service on Cloud historical scenarios replicate risk factor returns as observed in the past to create a distribution of risk factors, and hence of instrument returns, from which statistical risk measures (e.g., std dev, VaR) can be measured.

This simpler approach has relatively less configuration parameters than Monte Carlo scenarios. Possible customizations include:

- Generating multiple scenario sets, each with different observation windows, time horizons, or groups of risk factors that are allowed to fluctuate in isolation.
- Lengthening (considerably) the observation window, as a long period implies larger data volumes and a likely increase in the number of scenarios.
- Customizing elements of the scenario generation process. For example, a client might wish to provide their own time series to replace vendor data.

Sensitivities

Customized changes include:

- Increasing (considerably) the number of scenarios in any standard sensitivity. For example, increasing the number of curve shift scenarios to include more refined movements in the interest rate curves.
- Frequent updates to risk factor movements implied in each stress test.
- Creating new scenarios to calculate sensitivities to new risk factor types.

Stress tests

Customized changes include:

- Increasing (considerably) the number of scenarios.
- Frequent updates to risk factor movements implied in each stress test.

Advanced scenario construction options

Algo Risk Service on Cloud utilizes an award-winning scenario construction engine that provides a broad library of statistical models to analyze market data, derive co-dependencies across market risk factors, and generate scenarios under a variety of assumptions.

The scenario engine offers clients more advanced scenario construction options on demand. For example:

Monte Carlo scenarios

The scenario engine provides the ability to select different co-dependent structures.

- VcV (standard Algo Risk Service on Cloud) that essentially assumes a normal distribution of returns.
- Gaussian copulas, which allows non-normal distribution of returns by incorporating a vector of expected returns to the VcV which represents the relations between the risk factors.
- Mixture of normals that provide return distributions with heavy tails, to match the observed kurtosis of the empirical observations.

Standard shift scenarios

While normal shift scenarios specify risk factor movements in an absolute or factor form, standard shift scenarios specify those movements in numbers of standard deviations. The key advantage is an automatic calibration of the standard shift scenario to prevalent market volatilities. As volatility of the risk factor increases, the actual risk factor movement of a 1σ standard shift will also increase.

Standard shifts also present the benefit of incorporating the probability of the shift occurring. Assuming a standard normal distribution, the probability of different standard deviation shifts can be calculated. For example, probability of a +/- 1σ shift is approximately 68 percent.

Standard shifts can be used for both random defined scenarios and scenarios that replicate historical events. For example, the 1987 market crash can be categorized as a 6σ event.

Conditional scenarios

Typical shift or stress tests scenarios move a set of risk factors in isolation, while leaving others unchanged. For example, a -10bps parallel shift in United States Dollar (USD) curves has no impact on other regional interest rates or other types of risk factors. This allows the analysis of the USD curve shift in isolation.

It is also possible to include the co-dependency of risk factors into different shift or stress test scenarios. Using a VcV matrix that is built from a selected observation period, the conditional scenario process will infer movements in other risk factors given the prescribed change in the prescribed risk factor(s). In the above example, it is likely that a drop in USD interest rates would result in a drop in other regional rates if the prevailing global economy indicated a strong positive correlation across those factors, as governments adjusted their policies in similar fashions.

Scenarios on economic factors

Though economic factors such as Gross Domestic Product (GDP), inflation, or unemployment, are not traditionally utilized in instrument pricing models, it is possible to create scenarios where changes forecasted in those factors are translated to anticipated movements in market risk factors.

In this manner, portfolio managers' or market analysts' views on the economy can be translated into expected portfolio P&Ls and hence portfolio risk. This feature is based on the conditional scenario capabilities described above.

About Business Analytics

IBM Business Analytics software delivers data-driven insights that help organizations work smarter and outperform their peers. This comprehensive portfolio includes solutions for business intelligence, predictive analytics and decision management, performance management, and risk management.

Business Analytics solutions enable companies to identify and visualize trends and patterns in areas, such as customer analytics, that can have a profound effect on business performance. They can compare scenarios, anticipate potential threats and opportunities, better plan, budget and forecast resources, balance risks against expected returns and work to meet regulatory requirements. By making analytics widely available, organizations can align tactical and strategic decision-making to achieve business goals.

For more information

For further information please visit **ibm.com**/business-analytics.

Request a call

To request a call or to ask a question, go to **ibm.com**/business-analytics/contactus. An IBM representative will respond to your inquiry within two business days.

YTD03261-USEN-01