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Assessing Your Hidden "What-Ifs" with VaR

Contents

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Brian brings over 16 years of trading and risk management experience in the energy industry. He is responsible for the delivery of all aspects of the risk solution for SolArc RightAngle. Prior to SolArc, Brian served as the Risk Manager for the global crude trading desk at Koch Industries. He also managed the price structure book for the crude oil supply operations at Ashland and later, Marathon Ashland.

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Executive Summary

Uncertainty of outcomes, whether it's the flip of a coin, drawing the river to an opened-ended straight, or the impact of commodity market price movements to your bottom line, can cause anxiety, misunderstanding, and lead to bad decisions. Traders, CEOs and risk managers often find themselves grappling for answers on how to easily understand the uncertainties of their business. In the world of commodity trading, whether it's done for speculative risk taking or supply and marketing operations, we call it risk management. The ability to measure the uncertainty is the first step in managing the associated expectations. The flip of a coin is measured as a 50/50 proposition. Knowing if the return (value of the pot) justifies the possible loss (additional wager) for a given uncertainty (drawing to an open-ended straight) separates poker professionals from "dead money." Value-at-Risk (VaR), when properly used and understood, is a valuable tool for understanding the uncertainty associated with commodity and financial markets.

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"Corporate-wide methodologies, strategies and input can be automatically processed, altered, reviewed and reported across a single, all-inclusive, end-to-end view."

Insight provided by a robust VaR software package can provide executives, traders and risk managers an understanding of probable expected outcomes, and the frequency of deviations. Corporations taking on risk should, in addition to their overall market strategy, consider setting other parameters such as loss limits, stress test limits, front-line trader limits, as well as organizational changes and limitations. A quality risk analytics package will help provide each of these measures.

Strictly speaking, VaR analytics are designed to measure market risk, so companies must supplement their VaR analytics with a reliable and accurate end-to-end view of deals and exposures, including physical transaction data and credit risk. In this way, corporate-wide methodologies, strategies and input can be automatically processed, altered, reviewed and reported across a single, all-inclusive, end-to-end view. SolArc's key differentiating capability is in its offering of automatic, straight-through processing of commodity transactions data from SolArc RightAngle into robust RiskCenter, VaRCenter and CreditCenter analytics software solutions. The resulting sum total is a comprehensive physical-to-financial "virtual view" of deals and exposures, devoid of any time-consuming manual input, bad data entry, human error and missed market opportunities.

SolArc's VaRCenter provides risk analytics tools like Monte Carlo simulation, scenario analysis, price and volatility curve stressing, full revaluation for options and data maintenance. It enables the proactive assessment of business risk scenarios through accurate cash flow report generation, ensuring an in-depth analysis of financial exposures of each portfolio, book or strategy in the system, as well as a company-wide view of all exposures.

"Meticulous work in setting up VaR calculations and methodologies, stress and back testing, and straight-through data processing are critical."

What VaR Is – and Isn't

To calculate market risk exposure from trading activities or operations that move, store, or process commodities, VaR models (regardless of methodology) measures how market factors impact income and cash flow over the time the company holds a position within a set of defined parameters. Solid VaR analysis helps evaluate the impact of these changes on a firm's portfolio and provides guidance on how undesired risk can be mitigated. VaR is not a measure that defines the limit of what losses can occur, but what can normally be expected. VaR should be viewed in conjunction with stress testing and scenario analysis to understand the impact of market conditions and events outside the norm.

Additionally, VaR can also be used to define the risk-reward ratios of trading desks for resource allocation purposes, evaluate trader performance, examine portfolio sensitivity, and ferret out potential pitfalls. On the other hand, inaccurate exposure calculations and poor VaR implementation can lead to the input of meaningless "bad" data – leading traders, risk managers and CEOs down a wayward path to erroneous and potentially very costly market, credit and regulatory decisions. So meticulous work in setting up VaR calculations and methodologies, stress and back testing, and straight-through data processing are critical.

Some core functionality to consider in a top-notch VaR program, and those included in SolArc's newly released RiskCenter and VaRCenter, include:

Accurate cash flow assessment and report generation

- Accurate cash flow assessment and report generation, ensuring an in-depth analysis of company-wide financial exposures

"For precision, leading edge VaR programs use direct comparisons of both analytical and Monte Carlo methods."

Both a parametric (Variance/Co-variance) and Monte Carlo simulation VaR analytics

- Provides well known and easy-to-understand results
- Monte Carlo method is a must-have for commodities traders, accurate for trading options. *This allows flexibility for credit analysis in diversified portfolios and applying the full revaluation of derivatives.*
- For precision, leading edge VaR program use direct comparisons of both analytical and Monte Carlo methods

Multiple displays of options Greeks,

- Assessment of "optionality" (non-linear) risk
- Financial hedge trades
- Structured trades (swaps, swaptions, caps/floors/ collars, etc.)
- Embedded optionality (for example swing/flex – "zero-cost" collars)
- Market makers (taking positions on price curve or volatility)

Thorough back testing,

- Allows for a complete financial examination (required by regulators and board-level governance) by back testing VaR estimations vs. actual profit-and-loss numbers
- Back testing can check the accuracy of previous VaR calculations by running a test on how well the VaR performed relative to realized losses

Component VaR

- Gives an in-depth "drill-down" of the contribution to VaR by individual trades/trader, counterparty/counterparties, or by portfolios/strategies

For example, SolArc's VaRCenter can generate reports by quote, portfolio, deal, instrument, trader or counter-party.

Easy and timely quality data "clean-up"

- Interactive tools and data analysis reports

Stress testing analysis of "events" effects

- Price increase on a portfolio, an essential risk management tool

Robust volatilities and correlations calculations

- Using a customer's actual price history, applying weighting to most recent data

Interactive and batch mode utilization

- Proactive risk management and fast turnaround on issue resolution by quickly designing, testing and saving new scenarios
- Batch mode can display standard daily/weekly/monthly reports, distribute via e-mail and report in accordance with regulatory requirements

"Top-notch testing should assess the effects of events in terms of volatility, demand-supply and price curve stress."

Component VaR

Risk managers can use component-based VaR, to give an in-depth "drill-down" of components of VaR by individual trades/trader, counterparty/counterparties, or by portfolios/strategies. Component VaR helps identify the true contribution of a transaction by disaggregating each deal element, analyzing its stand-alone value and risk according to segmented counterparty, trader, deal, instrument, price curve, time period, commodity and other factors. For instance, SolArc's VaRCenter can calculate component VaR for all portfolios using parametric/ Monte Carlo methods and "decompose" the portfolio VaR to examine the impact of individual positions on overall VaR. These results can be used to find the "real contribution" of a deal or trade in a portfolio VaR, or the contribution of a portfolio in the company's total VaR. To help make the information highly actionable, RiskCenter facilitates the generation of IVaR reports organized by any of several components, including quote, portfolio, deal, instrument, trader or counterparty.

Stress Testing – Scenario Analysis

Stress testing, or scenario analysis, is an indispensable risk management tool and can analyze the affects of "events" (like a price increase) on a portfolio's value. Top-notch testing should assess the effects of events in terms of volatility, demand-supply and price curve stress. For instance, VaRCenter allows for up to five simultaneous analyses, such as correlated price curve stress, volatility stress, volume (supply-demand) stress analyses, and more. Scenario analyses are especially critical in testing extreme cases and are only possible through Monte Carlo stress testing.

"Static portfolio back testing is imperative to validate a VaR model."

Static Portfolio Back Testing

Static portfolio back testing provides rigorous and thorough back testing, allowing for a complete financial examination (required by regulators and board-level governance) by testing VaR estimations against actual profit-and-loss numbers. In other words, back testing can check the accuracy of previous VaR calculations by running a test on how well the VaR performed relative to realized losses. Static portfolio back testing is imperative to validate a VaR model.

User-Defined Reports

Because risk reports tend to be the most customized and personalized reports within a trading organization, it's critical to have risk information available that can automatically flow into usable, manageable and configurable formats. To answer that need, VaRCenter creates full-color reports for: VaR, IVaR, market data (price and correlation change, and volatility for market-contract-period), Management Cash Flow, Management Greeks, Management Back Tests, and stress tests.

About SolArc, Inc.

SolArc, Inc. is a leading provider of supply, trading and risk management solutions for global energy companies. The flagship product, SolArc RightAngle, integrates deal capture, scheduling, inventory management, pricing, accounting, position reporting, and risk analysis in a single platform solution. SolArc's products work with existing information systems including corporate ERP systems, to provide customers with a flexible solution that leverages the infrastructure of their existing systems. Customers receive competitive advantages from reduced transaction costs and improved commodities procurement and trading decisions based on accurate position reporting and inventory management. Headquartered in Houston, SolArc also has offices in Tulsa, Oklahoma; London; Singapore; Beijing; and Hong Kong. For more information on SolArc's products, visit www.solarc.com.

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Now, with the advent of the SEC's current mandatory compliance to the Sarbanes-Oxley Act (SOX), it is more important than ever for all publicly-traded companies to keep rigorous tabs on the accuracy of their internal accounting reporting. Non-compliance with SOX can translate into criminal and civil penalties for a lack of compliance, certification of internal auditing and increased financial disclosure. Clearly, non-compliance and inaccuracies in accounting can prove extremely time consuming and costly.

Conclusion

Superior risk analytics can enable the proactive assessment of business risk scenarios, while providing in-depth, forward-looking and company-wide views of all portfolios, strategies and exposures. So for a company that feels the need to pump up its stress testing and analytics computing muscle, a physical-to-financial view and a state-of-the-art VaR program is what the risk management department needs to make fast, market-savvy decisions.