



Market Risk Solution

Cognity is the new market benchmark in risk management and portfolio construction solutions: a “post modern” alternative to those provided by traditional vendors that makes quantitative risk management relevant to the realities of the volatile market conditions of 2009. Cognity is a new and practical Risk Solution for a changed world.

Cognity directly addresses the needs of the new market paradigm through profound improvements in underlying methodology for modeling **fat-tails** of asset returns and **asymmetric dependence** (correlation) structures.

This unique post-modern approach, already in use at leading global asset management organizations for mission critical reporting and analysis, positions Cognity as the only market solution to comprehensively incorporate modeling of real world phenomenon:

- Fat-tails - *the high risk of extreme events.*
- Tail and Asymmetric Dependence - *correlations become much higher during market stress.*
- Volatility Clustering - *when volatility is high its stays high for a while and when it is low it stays low for a while.*
- Risk Asymmetry - *negative extreme events are larger in magnitude than positive extreme events.*

As a result, Cognity overcomes the dangerous limitations of the classical risk management framework and provides the most realistic and accurate risk estimation available. These insights help Cognity users to actively manage tail-risk, improve the risk-return profile of their portfolios and communicate objective value added to their clients. Cognity clients are uniquely positioned to:

- Strategically manage risk - *monitor portfolio risk evolution over time and detect risk profile changes and style drifts.*
- Ensure accurate diversification - *actively manage tail risk and gain insight into the true tail risk diversifiers and contributors.*
- Anticipate and communicate the impact of abrupt market downturns on P&L and risk – *construct complex multi-dimensional stress scenarios.*
- Improve investment decision making - *build consensus through fat-tailed risk budgeting.*
- Enhance transparency and communication with investors and regulators – *implement a structured investment process.*
- Gain new investors – *demonstrate increased commitment to active risk management.*

Despite the complexity of the modeling required, this unique analytic insight is delivered through a practical set of user-friendly software modules. These are packaged with highly professional and accessible client support and consulting services, on site when required, to get the service up and running and to provide risk analysis and reports relevant to clients' particular and proprietary needs.

In addition to these advanced analytic techniques, FinAnalytica understands that clients need to compare post-modern results alongside traditional techniques to gain confidence and insight. Consequently, the Cognity platform also includes all classical risk statistics and models.

Users can even integrate other branded third-party risk models and factors. Thus, Cognity provides flexibility, scalability and complete analytic transparency. Cognity is a global, multi-currency cross asset solution covering an extensive list of asset classes and instrument types. FinAnalytica's ASP delivery provides very low cost of ownership and is immediately productive “out of the box”. Customized in-house, managed service installations are also available where necessary. FinAnalytica's team of dedicated and highly skilled support and consulting professionals make sure that the needs of clients are met in a timely and efficient manner delivering clear business value and rapid return on investment.

Cognity Market Risk Solution

The world has changed unrecognizably in the last two years. Cognity makes sense of the new paradigm and guides portfolio and risk managers to make better decisions. **Cognity is a new and practical Risk Solution for the changed world.**

Key Features

- **Standard and Post-modern Risk Measures:** Cognity provides classical performance measures such as volatility, tracking error, beta, MCTR and PCTR, VaR as well as Fat-tailed VaR and Fat-Tailed ETL with a breakdown by any factor and position characteristic. Cognity offers risk snapshots for a selected day as well as Risk Back-testing functionalities over a period of time.
- **Risk Backtesting** capability of Cognity allows observing risk evolution measured by VaR or ETL on portfolio, sub-portfolio, position or risk factor level. Comparing different risk measures over time may provide early warning indicator on potential changes in the market structure and the risk trends, as well as to identify dangerous changes in the holdings or factor exposures of portfolios.
- **Flexible Risk Models:** Cognity currently offers statistical factor models (known as “factor analysis”) and time series factor models in a framework that allows combinations of the two. Thus, a combination of observable and unobservable factors can be utilized to best explain and decompose portfolio risk. These factor models are fully integrated within the market risk module and can therefore utilize the fat-tails distributions framework. The end result is better explanatory power through more accurate modeling of factor and specific risk.
- **Stress Tests:** Cognity has powerful stress testing capabilities which enable the application of crisis scenarios to asset and factor correlations, factor exposures, simulation scenarios and distribution parameters.
- **Wide and rapidly expanding asset class coverage:** Cognity covers equities, fixed income, derivatives, FX, and credit products. New asset class calculators are regularly developed by FinAnalytica or supplied through integration with external vendors such as FinCad. A Web Services API is also available for interfacing with other valuation libraries.
- **Speed & Scalability:** Cognity post-modern methodology is implemented with focus on handling very large portfolio and risk models, accurate parameter estimation, speed and scalability. Client installations process more than 30,000 risk variables and portfolios of 60,000-100,000 positions. Most calculations have distributed computing algorithms for enhanced speed.
- **Custom Work Group Environment:** Cognity is a shared database environment for data, portfolios, risk models, calculations and reports. In addition to permissioned access, work groups can have tailored work flows and user interfaces to match specific roles.
- **Flexible Reporting:** Cognity provides extensive interactive drilldown reporting with both tabular and graphical displays. Reports are easily customized, formatted and exported to Excel.
- **Automation:** Cognity calculations can be combined into projects and run automatically through a batch processing facility.

Cognity Market Risk Solution

Key Module Details

Cognity meets the needs of investment-decision makers to demonstrate a structured investment process through a series integrated modules of fat-tailed portfolio risk decomposition, tail-risk budgeting, risk reporting, risk backtesting, bespoke factor modeling, stress testing, crisis simulation and quantitative asset screening and ranking.

All Cognity modules are fully integrated allowing for settings and results to be carried through the entire analytic process. Each module provides flexible settings for timeframe, data scenarios, data backfill & benchmark settings. User defined asset groups and custom risk decomposition templates provide powerful and easy drill-down reporting.

Market Risk

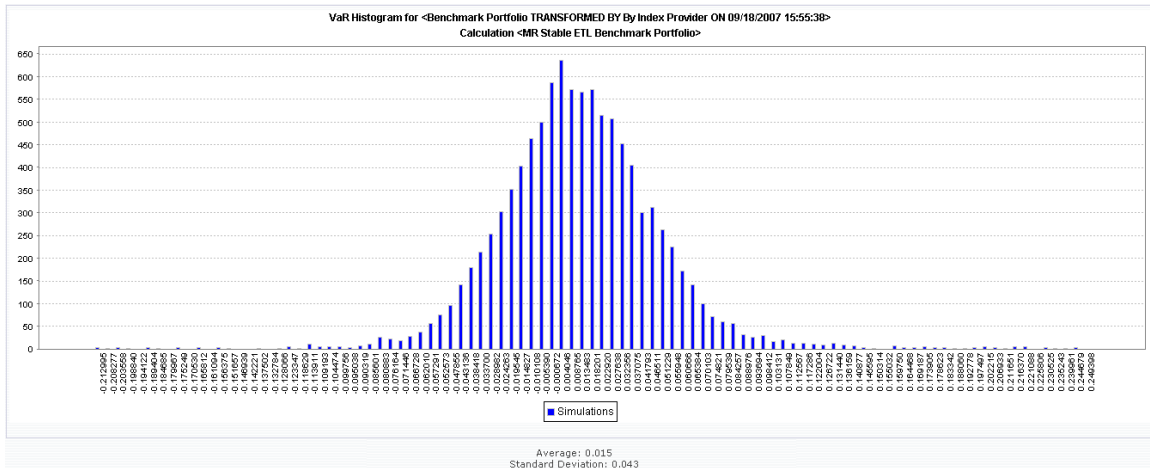
The screenshot displays the Cognity Market Risk software interface. On the left, a navigation pane shows 'Components Risk I' and 'Risk' with sub-items 'Residuals' and 'Factors'. The main area is titled 'Current Risk Tree' and 'Components Risk Model'. Below this, there are buttons for 'Report Details' and 'Save Report As'. A table displays risk metrics for various portfolios. The table has columns for Portfolio, VaR, ETL, Incremental VaR, Incremental ETL, Mean, Standard Deviation, and Beta To Portfolio. The data is organized into a tree structure, starting with a benchmark portfolio and branching into various stock groups like Commodities, Emerging Markets, Lehman Brothers, MSCI, REIT, Russell, and S&P. At the bottom, there is a 'Display Format' dropdown set to 'Percentage Loss' and a 'Submit' button.

Portfolio	VaR	ETL	Incremental VaR	Incremental ETL	Mean	Standard Deviation	Beta To Portfolio
(subP) Benchmark Portfolio TRANSFORMED BY By Index Provider ON 09/18/2007 15:55:38	4.028	6.317	N/A	N/A	1.548	4.263	1.0
(subP) JOIVAP-A2 1. Stock Group By IndexProvider Commodities	8.255	11.114	-0.456	-0.471	2.389	7.847	0.84
Softs	7.400	11.517	-0.015	-0.02	1.557	6.247	0.38
Livestock	9.758	14.895	-0.04	-0.09	0.171	7.855	-0.083
Energy	17.914	22.277	-0.06	-0.09	-3.091	10.007	0.307
Precious Metals	13.158	19.705	-0.104	-0.083	6.228	15.531	1.386
Industrial Metals	13.866	23.242	-0.107	-0.104	9.851	21.757	1.954
Grains	10.620	16.574	-0.01	-0.025	1.011	9.462	0.269
(subP) JOIVAP-A6 1. Stock Group By IndexProvider Emerging Markets	10.601	16.425	0.376	0.601	2.675	10.640	2.025
(subP) JOIVAP-A5 1. Stock Group By IndexProvider Lehman Brothers	1.085	1.361	-0.429	-0.664	-0.0025	0.658	0.035
(subP) JOIVAP-A0 1. Stock Group By IndexProvider MSCI	6.914	10.658	-0.134	0.071	2.320	7.548	1.381
(subP) JOIVAP-A1 1. Stock Group By IndexProvider REIT	7.048	10.627	-0.054	-0.18	1.565	6.161	0.811
(subP) JOIVAP-A3 1. Stock Group By IndexProvider Russell	7.298	10.510	0.174	0.262	1.376	5.936	1.166
(subP) JOIVAP-A4 1. Stock Group By IndexProvider S&P	4.864	6.898	-0.264	-0.543	0.947	4.048	0.779

Full and Flexible Parameter Settings:

- Dependence Structure modeling:
 - Independent and Dependent Tails
 - Fat-tail Copula
- Univariate Simulation Methods:
 - Historical & Normal Monte Carlo
 - Symmetric and Asymmetric Stable Monte Carlo
 - Student T and Asymmetric Student T Monte Carlo
 - ARMA-GARCH Scenarios
- Volatility and correlation settings:
 - Classical and EWMA correlation estimation methods
 - GARCH option
 - Stress-tests, Black-Litterman views or Bayes-Stein models options
- Mean Return Estimation Methods:
 - Classical or EWMA mean return estimation, or user-defined mean return options
 - ARMA

Cognity Market Risk Solution



Extensive Risk Reporting:

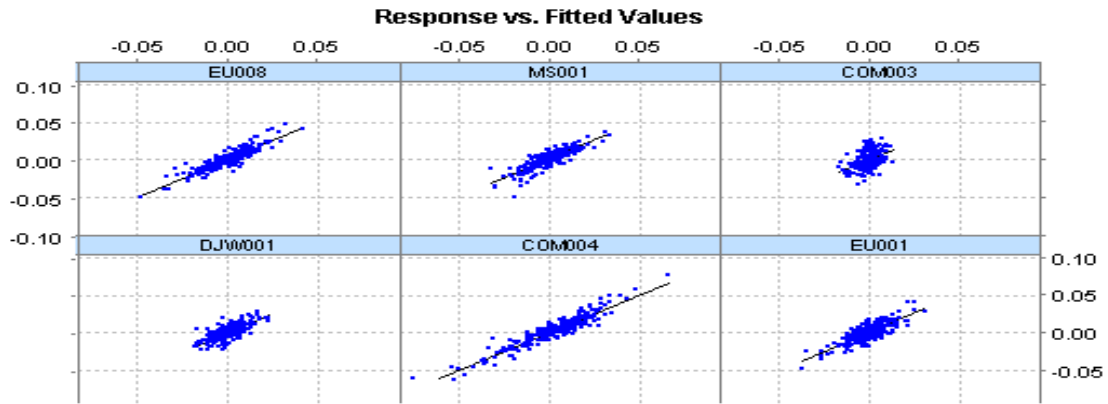
- Complete statistical output:
 - VaR & ETL
 - Incremental VaR & ETL
 - Present Value
 - Exposure
 - Market Value
 - Variance
 - Standard Deviation
 - Marginal Contribution to Risk (standard deviation and ETL)
 - Percentage Contribution to Risk (standard deviation and ETL)
 - Beta To Portfolio
 - Beta To Benchmark
 - Implied Return (standard deviation and ETL)
 - Mean Return
- Display and charting across multiple confidence intervals
- Percentage Loss, Threshold, Absolute Loss, Percentage Loss of Exposure, Percent of Total Portfolio, display options
- VaR, ETL, PV/VaR and histogram charts on portfolio, grouping and single asset level
- Risk evolution charts, simulated portfolio returns vs. simulated group level/single asset returns plots
- Complete risk budgeting reports and charts
- Interactive table of simulated price scenarios leading to different VaR levels on portfolio, group and single asset level

Risk Back Testing

- Reporting over any time period supported by data
- Automatic treatment of assets with missing data – an option to automatically exclude assets which do not have sufficient data from the calculation
- Ability to save all underlying risk reports for any date of the back testing period
- Summary report by both portfolio level and position including:
 - Evaluation Date
 - Returns
 - VaR and ETL
 - Incremental VaR and ETL
 - Exceedances
- Detailed report for each risk estimation date from the back test containing all information on single asset level
- Report containing more than 20 return, risk and risk-adjusted performance statistics on realized portfolio returns

Cognity Market Risk Solution

Factor Analysis



Time Series Factor Models

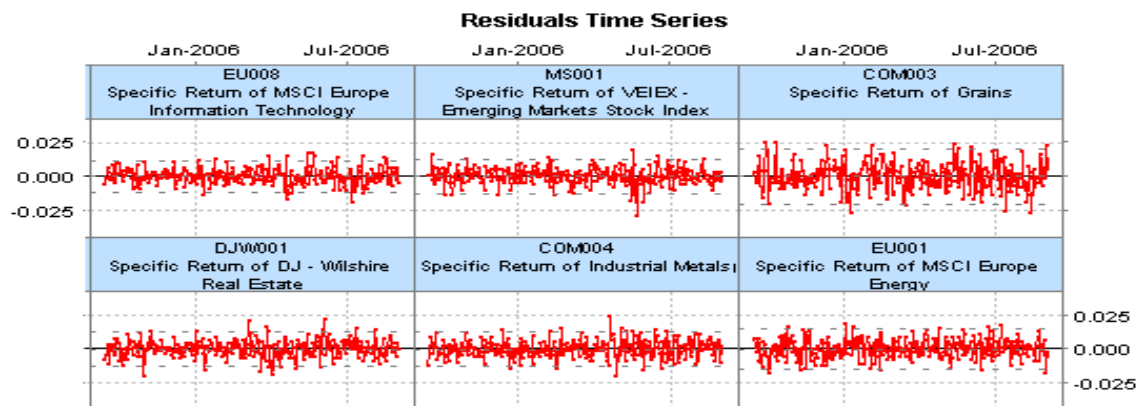
- Pre-defined and user defined risk models
- True step-wise regression (forward and backward)
- User defined factor selection metrics based on the step wise regression
- Factor exposures calculation by least squares (LS), robust or fat-tail L1 method
- Ability to specify functions for lagged variables (both for explanatory and dependent factors), square function for the explanatory & up and down market beta
- Option for stress-test scenarios
- Reports include: exposures, standard errors, confidence intervals, p-values, R-squared and Residual Variance; charts for residuals: time series, QQ-plots, histograms, probability densities and residuals vs. fitted values and response vs. fitted values;
- Comparison reporting & charting between changes in any calculation settings

Principle Component Factor Analyses

- Fully automated computation of "blind" factors with high explanatory power
- Reports: explained variance by factor, cumulative explained variance, Eigen values
- Charts for residuals: time series, QQ-plots, histograms and probability densities
- Option to store principle components as generic risk factors and use them in time series factor modeling

Statistical Factor Model Factor Analyses

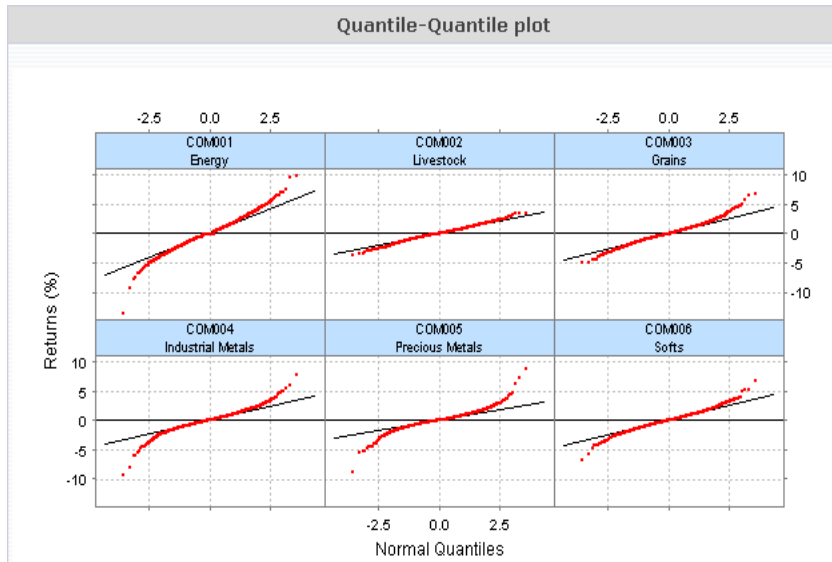
- Fully automated computation of "blind" factors with high explanatory power
- Scenario generation of factor returns, residuals and asset returns with full array of generalized fat-tailed distributions.
- Reports include: factor exposures, specific risk factors variations



Cognity Market Risk Solution

Quantitative Asset Screening

- Ranking of stocks, ETFs, mutual funds, hedge funds etc. by Standard Deviation, ETL, Sharpe Ratio, STARR and Rachev ratio
- Screening by portfolio or simple list of assets, asset class, or custom groups
- Data backfill and in-fill methods for short and illiquid series
- Extensive array of charts and tables including time series plots, box plots, risk versus return plots, quantile-quantile plots, histograms, probability densities & scatter plots
- Autocorrelation detection - classical and robust





Technical Overview

Platform

- Java client-server application
- Platform independent, currently on Windows or Linux OS
- Microsoft Sequel Server database
- Scalable multi-threaded, multi-processor and distributed computing
- Available as: In-house installation or ASP

User Interface

- Browser-based user interface
- Simple drop down menu interface and power user calculator access
- Customizable user interface (UI) to match any investment decision workflow
- Multiple UIs to match specific role or group workflows for any organizational structure
- Basic and Advanced calculator modes with default setting for easy and quick analysis

Data Import, Access & Export

- Simple and fully automated pricing and index data feed from Bloomberg, Thomson-Reuters QA
- Simple flat file and Excel file import of equity pricing & fundamental data
- Simple flat file and Excel file import of alpha forecasts, transaction costs and weight constraint files
- Simple flat file and Excel file import of portfolios and portfolio history
- Customizable connectivity to in-house databases and third party sources
- Flexible report output formats in HTML, Excel, text and XML

Batch Processing

- Flexible automated scheduling of any Cognity calculation or process
- Individual or aggregate calculations
- Automated results output

API Access

- Web Services API (C#, .Net)

www.finanalytica.com

New York 100 Park Avenue, 16th Floor
New York, NY 10017 USA
Telephone: (212) 880 - 2670
Fax: (212) 880 - 2679

London 1 Liverpool Street
London EC2M 7QD UK
Telephone: +44 (0) 20 7956 2778
Fax: +44 (0) 20 7956 2001