

RISK SIMULATOR

RISK SIMULATOR 2012

Monte Carlo Risk Simulation

38 Probability Distributions with easy-to-use interface, running Super Speed Simulation (thousands of trials in a few seconds) with Comprehensive Statistics and Reporting, Distributional Correlations with Copulas (Normal, T, Quasi-Normal), Multiple Random Generators, Truncation, Alternate Parameters, Linking capabilities, Multidimensional Simulations and Risk Simulator functions in Excel, and works with Windows 7/Vista/XP with Excel 2010/2007/2003 and MAC (Parallels or Virtual Machine)

Analytical Tools

Bootstrapping, Cluster Segmentation, Comprehensive Reports, Data Extraction, Data Import, Data Diagnostics (checks for data quality including heteroskedasticity, multicollinearity, nonlinearity, outliers, autocorrelation, and more), Distributional Fitting, Distributional Probabilities (PDF, CDF, ICDF), Hypothesis Testing, Overlay Charts, Sensitivity Analysis, Scenario Analysis, Statistical Analytics, Tornado and Spider Charts, Seasonality Test, Detrending, Cluster Analysis, Structural Breaks, ROV Bistats (160 business statistical models), ROV Decision Trees (Bayes' analysis, risk simulation on decision trees, sensitivity and scenario analysis, utility functions) and more

Forecasting

Box-Jenkins ARIMA, Auto ARIMA, Basic Econometrics, Auto Econometrics, Cubic Spline, Custom Distributions, GARCH, J Curve, S Curve, Markov Chain, Maximum Likelihood, Limited Dependent Variables (Logit, Probit, Tobit), Multiple Regression, Nonlinear Extrapolation, Stochastic Processes, Time-Series Decomposition, Multivariate Trendlines

Optimization

Static, Dynamic and Stochastic Optimization with Continuous, Discrete and Integer Decision Variables, Efficient Frontier, Project Portfolio Selection, Linear and Nonlinear Optimization



WHAT IS RISK ANALYSIS?

How do you make critical business decisions? Do you consider the risks of your projects and decisions, or are you more focused on returns? Do you have a hard time trying to understand what risk is, let alone quantifying risk? Well, our Risk Simulator software will help you identify, quantify, and value risk in your projects and decisions.

RISK SIMULATOR is a powerful Excel add-in software used for applying simulation, forecasting, statistical analysis, and optimization in your existing Excel spreadsheet models. The software was developed specifically to be extremely easy to use. For instance, running a risk simulation is as simple as 1-2-3, set an input, set an output, and run. Performing forecasting can be as simple as two or three mouse clicks away and the software does everything for you automatically, complete with detailed reports, powerful charts and numerical results. It even comes in English, Spanish, Chinese and Japanese, with additional languages on their way.

If we have the technology to send spacecrafts half way across the solar system, why can't we spend a little more time quantifying risk? Such technology already exists and Risk Simulator encapsulates these advanced methodologies into a simple and user-friendly tool. We have books, live training (Certification in Risk Management) seminars, training DVDs, consultants and free sample getting started videos in risk analysis and modeling on our website.

Risk Simulator is also integrated with our other software including the Real Options Super Lattice Solver, Employee Stock Options Valuation Toolkit, Modeling Toolkit (Over 800 Functions and 300 Models), ROV Modeler, ROV Optimizer, ROV Valuator, ROV Basel II Modeler, ROV Compiler, ROV Extractor and Evaluator, and ROV Dashboard. Please visit our website for more details.

MODULE DETAILS

Monte Carlo Risk Simulation

45 Probability Distributions with very easy-to-use interface, running Super Speed Simulations (thousands of trials in a few seconds) with Comprehensive Statistics and Reporting capabilities, Distributional Correlations with Copulas (Normal, T, Quasi-Normal), Various Random Number Generators, Truncation, Alternate Parameters, Linking capabilities, Multidimensional Simulations and Risk Simulator functions in Excel. All of this in 11 foreign languages including English.

Analytical Tools

Bootstrapping, Cluster Segmentation, Comprehensive Reports, Data Extraction, Data Import, Detailed Data Diagnostics (heteroskedasticity, autocorrelation, multicollinearity, outliers, and much more), Distributional Fitting, Distributional Exact Probabilities (PDF, CDF, ICDF), Hypothesis Testing, Dynamic Sensitivity Analysis, Scenario Analysis, Tornado and Spider Charts, Seasonality Test, Structural Break, Segmentation Clustering, Cyclicity Detrending, ROV Bistats (160 business statistical models), ROV Decision Trees (Bayes' analysis, risk simulation on decision trees, sensitivity and scenario analysis, utility functions), and much more!

Forecasting

Box-Jenkins ARIMA, Auto ARIMA, Basic Econometrics, Auto Econometrics, Cubic Spline, Customized Distributions, GARCH Volatility, J Curve, S Curve, Markov Chains, Limited Dependent Variables (Logit, Probit, Tobit), Multiple Regression, Nonlinear Extrapolation, Stochastic Processes, Time-Series Decomposition, Trendlines and more! Watch out for more advanced techniques in future versions!

Optimization

Static, Dynamic and Stochastic Optimization with Continuous, Discrete and Integer Decision Variables, Efficient Frontier Analysis, Linear and Nonlinear Optimization with complete control over the advanced algorithm types and precision levels

SUPPORT MATERIALS

- 10 books on risk analysis, simulation, forecasting, optimization, real options, and options valuation written by the software's creator
- Training DVD on risk analysis (simulation, forecasting, optimization, real options, and applied business statistics)
- Live training and certification courses on general risk management, risk simulation, forecasting, optimization, and strategic real options analysis
- Detailed user manual, help file, and an extensive library of example files
- Live project consultants with advanced degrees and years of consulting and industry experience

TRIAL AND ACADEMIC VERSIONS

Risk Simulator can be downloaded immediately from our website with a default 10 day trial license. Our philosophy is you get to try before you buy. Once you use it, we are convinced you will fall in love with the simplicity and the power of the tool, and it will become an indispensable part of your modeling toolbox. We also have academic licenses for full time professors teaching risk analysis (and their students) or other associated courses using Risk Simulator or our other software products. Contact admin@realoptionsvaluation.com for details.

TRAINING AND CONSULTING

Advanced analytical tools such as the Risk Simulator software are built to be easy to use but may get the analyst in trouble if used inappropriately. Sufficient theoretical understanding coupled with pragmatic application experience is vital; therefore, training is critical.

Our **Risk Analysis** course is a two-day seminar focused on hands-on computer-based software training, with topics covering the basics of risk and uncertainty, using Monte Carlo simulation (pitfalls and due diligence), and all of the detailed methods in forecasting and optimization.

We also have a **Real Options for Analysts** course for the analysts who want to immediately begin applying strategic real options in their work, but lack the hands-on experience with real options analytics and modeling. This two-day course covers how to set up real options models, apply real options, and solve real options problems using simulation, closed-form mathematics, binomial and multinomial lattices using the Real Options SLS software.

The **Certified in Risk Management (CRM)** seminar is a four-day hands-on class that covers the materials on our Risk Analysis and Real Options for Analysts courses and geared towards the CRM certification provided by the International Institute of Professional Education and Research (AACSB member and eligible for 30 PDU credits with the PMI).

Our **Risk Analysis for Senior Managers** is a one day course specially designed for senior executives, where we will review case studies in risk management from 3M, Airbus, Boeing, GE, and many others. It provides an executive overview of risk analysis, strategic real options, portfolio optimization, forecasting and risk concepts without the technical details.

Also available are other customized decision, valuation and risk analysis courses with an emphasis on on-site trainings customized to your firm's exact needs based on your business cases and models). Consulting services are available, including the framing of risk analysis problems, simulation, forecasting, real options, risk analytics, model building, decision analysis, integrated OEM and software customization.

EXPERTISE

Dr. Johnathan Mun is the software's creator and teaches the **Risk Analysis, Real Options for Analysts, Risk Analysis for Managers, CRM**, and other courses. He has consulted for many Fortune 500 firms (from 3M, Airbus, Boeing to GE and Motorola) and the government (Department of Defense, State and Federal Agencies) on risk analysis, valuation, and real options, and has written a number of books on the topic, including *Modeling Risk: Applying Monte Carlo Simulation, Real Options Analysis, Forecasting and Optimization, 1st and 2nd Edition* (Wiley, 2006, 2010); *Real Options Analysis: Tools and Techniques, 1st and 2nd Edition* (Wiley Finance, 2005, 2002); *Real Options Analysis Course: Business Cases* (Wiley Finance, 2003); *Applied Risk Analysis: Moving Beyond Uncertainty in Business* (Wiley, 2003); *Valuing Employee Stock Options Under 2004 FAS 123* (Wiley Finance, 2004); *Advanced Analytical Models: 800 Functions and 300 Models from Basel II to Wall Street and Beyond* (Wiley 2008); *The Banker's Handbook on Credit Risk: Implementing Basel II* (Elsevier Academic Press 2008); and others. He is the founder and CEO of Real Options Valuation, Inc., and is responsible for the development of analytical software products, consulting, and training services. He was formerly Vice President of Analytics at Decisioneering, Inc. (Oracle), and was a Consulting Manager in KPMG's Global Financial Strategies practice. Before KPMG, he was head of financial forecasting for Viking, Inc. (an FDx/FedEx Company). Dr. Mun is also a full professor at the U.S. Naval Postgraduate School and a professor at the University of Applied Sciences and Swiss School of Management (Zurich and Frankfurt), and he has held other adjunct professorships at various universities. He has a Ph.D. in finance and economics, an MBA in business administration, an M.S. in the area of management science, and a BS in applied sciences. He is certified in Financial Risk Management (FRM), Certified in Financial Consulting (CFC), and Certified in Risk Management (CRM).

English, French, German, Italian, Japanese, Korean, Portuguese, Spanish, Simplified Chinese, Traditional Chinese

Works in Window 7, Vista and XP; integrates with Excel 2010, 2007, 2003; and works in MAC operating systems running virtual machines.

Fully customizable colors and charts (tilt, 3D, color, chart type, and much more!)

Multiple language user manuals and help files

42 detailed example models

Linkable to Real Options SLS and Modeling Toolkit

All analyses come with detailed reports

RS functions and right-click support in Excel

Works well with other ROV software including: Real Options SLS, Modeling Toolkit, Basel Toolkit, ROV Compiler, ROV Extractor and Evaluator, ROV Modeler, ROV Valuator, ROV Optimizer, ROV Dashboard, ESO Valuation Toolkit, and others!

6 random number generators, 3 correlation copulas (Normal, T, Quasi-Normal), and 2 sampling methods (Monte Carlo and Latin Hypercube)

General Settings

multiphasic optimization

general linear optimization

detailed results including Hessian matrices, LaGrange functions and more

quick optimizations

continuous, integers and binary optimizations

simulation with optimization

quadratic, tangential, central, forward, convergence criteria

combinations of stochastic and dynamic optimizations on multivariate efficient frontiers

Optimization

tests for the most common mistakes in your model

runs tests on heteroskedasticity, micronumerosity, outliers, nonlinearity, autocorrelation, normality, sphericity, nonstationarity, multicollinearity and correlations

Risk Simulator 2011

extract data to Excel or flat text files and Risk Sim files, runs statistical reports and forecast result reports

retrieves previous simulation run results

deasonalizes and detrends your data

computes exact PDF, CDF and ICDF of all 42 distributions and generates probability tables

create your own custom distributions

Kolmogorov-Smirnov and Chi-Square tests on continuous distributions, complete with reports and distributional assumptions

runs multiple variables simultaneously, accounts for correlations and correlation significance

tests if two forecasts are statistically similar or different

simulation of the statistics to obtain the precision and accuracy of the results

fully customizable overlay charts of assumptions and forecasts together (CDF, PDF, 2D/3D chart types)

tests the best predictor variables and ways to reduce the data array

hundreds and thousands of static two dimensional scenarios

tests for various seasonality lags

groups data into statistical clusters for segmenting your data

dynamic sensitivity (simultaneous analysis)

descriptive statistics, distributional fitting, histograms, charts, nonlinear extrapolation, normality test, stochastic parameters estimation, time-series forecasting, trend line projections, etc

tests if your time-series data has statistical structural breaks

static perturbation of sensitivities, spider and tornado analysis, and scenario tables

Analytics

Business Statistics

Percentile Distributional Fitting

Probability Distributions

Statistical Analysis—descriptive statistics, distributional fitting, histograms, charts, nonlinear extrapolation, normality test, stochastic parameters estimation, time-series forecasting, trend line projections, etc

ROV BIZSTATS—over 130 business statistics and analytical models: Absolute Values, ANOVA: Randomized Blocks Multiple Treatments, ANOVA: Single Factor Multiple Treatments, ANOVA: Two Way Analysis, ARIMA, Auto ARIMA, Autocorrelation & Partial Autocorrelation, Autocorrelations (Detailed), Autocorrelations (Quick), Average, Control Chart: C, Control Chart: NP, Control Chart: P, Control Chart: R, Control Chart: U, Control Chart: X, Control Chart: XMR, Correlation, Correlation (Linear, Nonlinear), Count, Covariance, Cubic Spline, Custom Econometric Model, Data Descriptive Statistics, Deseasonalize, Difference, Distributional Fitting, Exponential J Curve, GARCH, Heteroskedasticity, Lag Lead, Limited Dependent Variables (Logit), Limited Dependent Variables (Probit), Limited Dependent Variables (Tobit), Linear Interpolation, Linear Regression, LN, Log, Logistic S Curve, Markov Chain, Max, Median, Min, Mode, Nonlinear Regression, Nonparametric: Chi-Square Goodness of Fit, Nonparametric: Chi-Square Independence, Nonparametric: Chi-Square Population Variance, Nonparametric: Friedman's Test, Nonparametric: Kruskal-Wallis Test, Nonparametric: Lilliefors Test, Nonparametric: Runs Test, Nonparametric: Wilcoxon Signed-Rank (One Var), Nonparametric: Wilcoxon Signed-Rank (Two Var), Parametric: One Variable (T) Mean, Parametric: One Variable (Z) Mean, Parametric: One Variable (Z) Proportion, Parametric: Two Variable (F) Variances, Parametric: Two Variable (T) Dependent Means, Parametric: Two Variable (T) Independent Equal Variances, Parametric: Two Variable (T) Independent Unequal Variances, Parametric: Two Variable (Z) Independent Means, Parametric: Two Variable (Z) Independent Proportions, Power, Principal Component Analysis, Rank Ascending, Rank Descending, Relative LN Returns, Relative Returns, Seasonality, Segmentation Clustering, Semi-Standard Deviation (Lower), Semi-Standard Deviation (Upper), Standard 2D Area, Standard 2D Bar, Standard 2D Line, Standard 2D Point, Standard 2D Scatter, Standard 3D Area, Standard 3D Bar, Standard 3D Line, Standard 3D Point, Standard 3D Scatter, Standard Deviation (Population), Standard Deviation (Sample), Stepwise Regression (Backward), Stepwise Regression (Correlation), Stepwise Regression (Forward), Stepwise Regression (Forward-Backward), Stochastic Processes (Exponential Brownian Motion), Stochastic Processes (Geometric Brownian Motion), Stochastic Processes (Jump Diffusion), Stochastic Processes (Mean Reversion with Jump Diffusion), Stochastic Processes (Mean Reversion), Structural Break, Sum, Time-Series Analysis (Auto), Time-Series Analysis (Double Exponential Smoothing), Time-Series Analysis (Double Moving Average), Time-Series Analysis (Holt-Winter's Additive), Time-Series Analysis (Holt-Winter's Multiplicative), Time-Series Analysis (Seasonal Additive), Time-Series Analysis (Seasonal Multiplicative), Time-Series Analysis (Single Exponential Smoothing), Time-Series Analysis (Single Moving Average), Trend Line (Difference Detrended), Trend Line (Exponential Detrended), Trend Line (Exponential), Trend Line (Linear Detrended), Trend Line (Linear), Trend Line (Logarithmic Detrended), Trend Line (Logarithmic), Trend Line (Moving Average Detrended), Trend Line (Moving Average), Trend Line (Polynomial Detrended), Trend Line (Polynomial), Trend Line (Power Detrended), Trend Line (Power), Trend Line (Rate Detrended), Trend Line (Static Mean Detrended), Trend Line (Static Median Detrended), Variance (Population), Variance (Sample), Volatility: EGARCH, Volatility: EGARCH-T, Volatility: GARCH, Volatility: GARCH-M, Volatility: GJR, Volatility: GJR-TGARCH, Volatility: Log Returns Approach, Volatility: TGARCH, Volatility: TGARCH-M, Yield Curve (Bliss), and Yield Curve (Nelson-Siegel).

Forecasting

autoregressive integrated moving average models

ARIMA (P, D, Q)

Auto ARIMA

runs the most common combinations of ARIMA to find the best-fitting model

Auto Econometrics

runs thousands of model combinations and permutations to obtain the best-fitting model for existing data (linear, nonlinear, interacting, lag, leads, rate, difference)

Basic Econometrics

econometric and linear/nonlinear and interacting regression models

Cubic Spline

nonlinear interpolation and extrapolation

GARCH

volatility projections using generalized autoregressive conditional heteroskedasticity models: GARCH, GARCH-M, TGARCH, TGARCH-M, EGARCH, EGARCH-T, GJR-GARCH, GJR-TGARCH

J-S Curves

logistic S and exponential J curves

Markov Chains

two competing elements over time and market share predictions

Limited Dependent Variables

Logit, Probit, Tobit: logistic-based regressions for forecasting probability of an event

Multiple Regression Analysis

linear and nonlinear regression, stepwise regression with detailed reports (correlation, forward, backward, combination)

Nonlinear Extrapolation

nonlinear time-series forecasting

Stochastic Processes

forecasting using simulation and geometric and exponential Brownian motion, mean-reversion, jump diffusion, and mixed processes

Time-Series Analysis

8 time-series decomposition models for predicting levels, trends and seasonalities

Trendlines

linear, nonlinear, power, logarithmic, exponential, moving average with goodness of fit

Simulation

42 Distributions

Super Speed Simulation

runs 100,000 trials in a few seconds

Custom Distribution

make your own distributions, running historical simulations, and applying the Delphi method

Discrete and Continuous Distributions

correlated simulations, truncation, alternate parameters, multidimensional simulation

Distributions as Excel Functions

set input assumptions and output forecasts using functions inside Excel

Correlations

correlated simulations with copulas (Normal, T, Quasi-Normal)

Sampling Methods

Monte Carlo and Latin Hypercube

Random Number Generator

ROV Advanced Subtractive Generator, Subtractive Random Shuffle Generator, Long Period Shuffle Generator, Portable Random Shuffle Generator, Quick IEEE Hex Generator, Basic Minimal Portable Generator

WHAT'S NEW IN VERSION 2012

A Comprehensive List of *Risk Simulator's* Capabilities

The following lists the main capabilities of *Risk Simulator*, where the highlighted items indicate the latest additions to version 2012.

General Capabilities

1. Available in 11 languages—English, French, German, Italian, Japanese, **Korean**, Portuguese, Spanish, Simplified Chinese, **Russian**, and **Traditional Chinese**.
2. Books—analytical theory, application, and case studies are supported by 10 books.
3. Commented Cells—turn cell comments on or off and decide if you wish to show cell comments on all input assumptions, output forecasts, and decision variables.
4. Detailed Example Models—24 example models in *Risk Simulator* and over 300 models in *Modeling Toolkit*.
5. Detailed Reports—all analyses come with detailed reports.
6. Detailed User Manual—step-by-step user manual.
7. Flexible Licensing—certain functionalities can be turned on or off to allow you to customize your risk analysis experience. For instance, if you are only interested in the forecasting tools in *Risk Simulator*, you may be able to obtain a special license that activates only the forecasting tools and leaves the other modules deactivated, thereby saving some costs on the software.
8. Flexible Requirements—works in Window 7, Vista, and XP; integrates with Excel 2010, 2007, 2003; and works in MAC operating systems running virtual machines.
9. Fully customizable colors and charts—tilt, 3D, color, chart type, and much more!
10. Hands-on Exercises—detailed step-by-step guide to running *Risk Simulator*, including guides on interpreting the results.
11. Multiple Cell Copy and Paste—allows assumptions, decision variables, and forecasts to be copied and pasted.
12. Profiling—allows multiple profiles to be created in a single model (different scenarios of simulation models can be created, duplicated, edited, and run in a single model).
13. Revised Icons in Excel 2007/2010—a completely reworked icon toolbar that is more intuitive and user friendly. There are four sets of icons that fit most screen resolutions (1280 x 760 and above).
14. Right-Click Shortcuts—access all of *Risk Simulator's* tools and menus using a mouse right-click.
15. ROV Software Integration—works well with other ROV software including Real Options SLS, Modeling Toolkit, Basel Toolkit, ROV Compiler, ROV Extractor and Evaluator, ROV Modeler, ROV Valuator, ROV Optimizer, ROV Dashboard, ESO Valuation Toolkit, and others!
16. RS Functions in Excel—insert RS functions for setting assumptions and forecasts, and right-click support in Excel.
17. Troubleshooter—allows you to reenable the software, check for your system requirements, obtain the Hardware ID, and others.

18. Turbo Speed Analysis—runs forecasts and other analyses tools at blazingly fast speeds (enhanced in version 5.2). The analyses and results remain the same but are now computed very quickly; reports are generated very quickly as well.
19. Web Resources, Case Studies, and Videos—download free models, getting-started videos, case studies, whitepapers, and other materials from our website.

Simulation Module

20. 6 random number generators—ROV Advanced Subtractive Generator, Subtractive Random Shuffle Generator, Long Period Shuffle Generator, Portable Random Shuffle Generator, Quick IEEE Hex Generator, and Basic Minimal Portable Generator.
21. 2 sampling methods—Monte Carlo and Latin Hypercube.
22. 3 Correlation Copulas—applying Normal Copula, T Copula, and Quasi-Normal Copula for correlated simulations.
23. 42 probability distributions—arcsine, Bernoulli, beta, beta 3, beta 4, binomial, Cauchy, chi-square, cosine, custom, discrete uniform, double log, Erlang, exponential, exponential 2, F distribution, gamma, geometric, Gumbel max, Gumbel min, hypergeometric, Laplace, logistic, lognormal (arithmetic) and lognormal (log), lognormal 3 (arithmetic) and lognormal 3 (log), negative binomial, normal, parabolic, Pareto, Pascal, Pearson V, Pearson VI, PERT, Poisson, power, power 3, Rayleigh, t and t2, triangular, uniform, Weibull, Weibull 3.
24. Alternate Parameters—using percentiles as an alternate way of inputting parameters.
25. Custom Nonparametric Distribution—make your own distributions for running historical simulations, and applying the Delphi method.
26. Distribution Truncation—enabling data boundaries.
27. Excel Functions—set assumptions and forecasts using functions inside Excel
28. Multidimensional Simulation—simulation of uncertain input parameters.
29. Precision Control—determines if the number of simulation trials run is sufficient.
30. Super Speed Simulation—runs 100,000 trials in a few seconds.

Forecasting Module

31. ARIMA—autoregressive integrated moving average models ARIMA (P,D,Q).
32. Auto ARIMA—runs the most common combinations of ARIMA to find the best-fitting model.
33. Auto Econometrics—runs thousands of model combinations and permutations to obtain the best-fitting model for existing data (linear, nonlinear, interacting, lag, leads, rate, difference).
34. Basic Econometrics—econometric and linear/nonlinear and interacting regression models.
35. Combinatorial Fuzzy Logic Forecasts—time-series forecast methods
36. Cubic Spline—nonlinear interpolation and extrapolation.
37. GARCH—volatility projections using generalized autoregressive conditional heteroskedasticity models: GARCH, GARCH-M, TGARCH, TGARCH-M, EGARCH, EGARCH-T, GJR-GARCH, and GJR-TGARCH.
38. J-Curve—exponential J curves.
39. Limited Dependent Variables—Logit, Probit, and Tobit.
40. Markov Chains—two competing elements over time and market share predictions.
41. Multiple Regression—regular linear and nonlinear regression, with stepwise methodologies (forward, backward, correlation, forward-backward).
42. Neural Network Forecasts—linear, nonlinear logistic, hyperbolic tangent, and cosine

43. Nonlinear Extrapolation—nonlinear time-series forecasting.
44. S Curve—logistic S curves.
45. Time-Series Analysis—8 time-series decomposition models for predicting levels, trends, and seasonalities.
46. **Trendlines—forecasting and fitting using linear, nonlinear polynomial, power, logarithmic, exponential, and moving averages with goodness of fit.**

Optimization Module

47. Linear Optimization—multiphasic optimization and general linear optimization.
48. Nonlinear Optimization—detailed results including Hessian matrices, LaGrange functions, and more.
49. Static Optimization—quick runs for continuous, integers, and binary optimizations.
50. Dynamic Optimization—simulation with optimization.
51. Stochastic Optimization—quadratic, tangential, central, forward, and convergence criteria.
52. Efficient Frontier—combinations of stochastic and dynamic optimizations on multivariate efficient frontiers.
53. **Genetic Algorithms**—used for a variety of optimization problems.
54. Multiphasic Optimization—testing for local versus global optimum allowing better control over how the optimization is run, and increases the accuracy and dependency of the results.
55. Percentiles and Conditional Means—additional statistics for stochastic optimization, including percentiles as well as conditional means, which are critical in computing conditional value at risk measures.
56. **Search Algorithm**—simple, fast, and efficient search algorithms for basic single decision variable and goal seek applications.
57. Super Speed Simulation in Dynamic and Stochastic Optimization—runs simulation at super speed while integrated with optimization.

Analytical Tools Module

58. **Check Model**—tests for the most common mistakes in your model.
59. Correlation Editor—allows large correlation matrices to be directly entered and edited.
60. Create Report—automates report generation of assumptions and forecasts in a model.
61. Create Statistics Report—generates comparative report of all forecast statistics.
62. Data Diagnostics—runs tests on heteroskedasticity, micronumerosity, outliers, nonlinearity, autocorrelation, normality, sphericity, nonstationarity, multicollinearity, and correlations.
63. Data Extraction and Export—extracts data to Excel or flat text files and Risk Sim files, runs statistical reports and forecast result reports.
64. Data Open and Import—retrieves previous simulation run results.
65. **Deseasonalization and Detrending**—deasonalizes and detrends your data.
66. Distributional Analysis—computes exact PDF, CDF, and ICDF of all 42 distributions and generates probability tables.
67. Distributional Designer—allows you to create custom distributions.
68. Distributional Fitting (Multiple)— runs multiple variables simultaneously, accounts for correlations and correlation significance.
69. Distributional Fitting (Single)—Kolmogorov-Smirnov and chi-square tests on continuous distributions, complete with reports and distributional assumptions.

70. Hypothesis Testing—tests if two forecasts are statistically similar or different.
71. Nonparametric Bootstrap—simulation of the statistics to obtain the precision and accuracy of the results.
72. Overlay Charts—fully customizable overlay charts of assumptions and forecasts together (CDF, PDF, 2D/3D chart types).
73. **Principal Component Analysis**—tests the best predictor variables and ways to reduce the data array.
74. Scenario Analysis—hundreds and thousands of static two-dimensional scenarios.
75. Seasonality Test—tests for various seasonality lags.
76. Segmentation Clustering—groups data into statistical clusters for segmenting your data.
77. Sensitivity Analysis—dynamic sensitivity (simultaneous analysis).
78. **Structural Break Test**—tests if your time-series data has statistical structural breaks.
79. Tornado Analysis—static perturbation of sensitivities, spider and tornado analysis, and scenario tables.

Statistics and BizStats Module

80. **Percentile Distributional Fitting**—using percentiles and optimization to find the best-fitting distribution.
81. **Probability Distributions' Charts and Tables**—run 45 probability distributions, their four moments, CDF, ICDF, PDF, charts, and overlay multiple distributional charts, and generate probability distribution tables.
82. Statistical Analysis—descriptive statistics, distributional fitting, histograms, charts, nonlinear extrapolation, normality test, stochastic parameters estimation, time-series forecasting, trendline projections, etc.
83. **ROV Decision Tree** is used to create and value decision tree models. Additional advanced methodologies and analytics are also included:
 - o Decision Tree Models
 - o Monte Carlo risk simulation
 - o Sensitivity Analysis
 - o Scenario Analysis
 - o Bayesian (Joint and Posterior Probability Updating)
 - o Expected Value of Information
 - o MINIMAX
 - o MAXIMIN
 - o Risk Profiles
84. **ROV BIZSTATS**—over 130 business statistics and analytical models:

Absolute Values, ANOVA: Randomized Blocks Multiple Treatments, ANOVA: Single Factor Multiple Treatments, ANOVA: Two Way Analysis, ARIMA, Auto ARIMA, Autocorrelation and Partial Autocorrelation, Autoeconometrics (Detailed), Autoeconometrics (Quick), Average, Combinatorial Fuzzy Logic Forecasting, Control Chart: C, Control Chart: NP, Control Chart: P, Control Chart: R, Control Chart: U, Control Chart: X, Control Chart: XMR, Correlation, Correlation (Linear, Nonlinear), Count, Covariance, Cubic Spline, Custom Econometric Model, Data Descriptive Statistics, Deseasonalize, Difference, Distributional Fitting, Exponential J Curve, GARCH, Heteroskedasticity, Lag, Lead, Limited Dependent Variables (Logit), Limited Dependent Variables (Probit), Limited Dependent

Variables (Tobit), Linear Interpolation, Linear Regression, LN, Log, Logistic S Curve, Markov Chain, Max, Median, Min, Mode, Neural Network, Nonlinear Regression, Nonparametric: Chi-Square Goodness of Fit, Nonparametric: Chi-Square Independence, Nonparametric: Chi-Square Population Variance, Nonparametric: Friedman's Test, Nonparametric: Kruskal-Wallis Test, Nonparametric: Lilliefors Test, Nonparametric: Runs Test, Nonparametric: Wilcoxon Signed-Rank (One Var), Nonparametric: Wilcoxon Signed-Rank (Two Var), Parametric: One Variable (T) Mean, Parametric: One Variable (Z) Mean, Parametric: One Variable (Z) Proportion, Parametric: Two Variable (F) Variances, Parametric: Two Variable (T) Dependent Means, Parametric: Two Variable (T) Independent Equal Variance, Parametric: Two Variable (T) Independent Unequal Variance, Parametric: Two Variable (Z) Independent Means, Parametric: Two Variable (Z) Independent Proportions, Power, Principal Component Analysis, Rank Ascending, Rank Descending, Relative LN Returns, Relative Returns, Seasonality, Segmentation Clustering, Semi-Standard Deviation (Lower), Semi-Standard Deviation (Upper), Standard 2D Area, Standard 2D Bar, Standard 2D Line, Standard 2D Point, Standard 2D Scatter, Standard 3D Area, Standard 3D Bar, Standard 3D Line, Standard 3D Point, Standard 3D Scatter, Standard Deviation (Population), Standard Deviation (Sample), Stepwise Regression (Backward), Stepwise Regression (Correlation), Stepwise Regression (Forward), Stepwise Regression (Forward-Backward), Stochastic Processes (Exponential Brownian Motion), Stochastic Processes (Geometric Brownian Motion), Stochastic Processes (Jump Diffusion), Stochastic Processes (Mean Reversion with Jump Diffusion), Stochastic Processes (Mean Reversion), Structural Break, Sum, Time-Series Analysis (Auto), Time-Series Analysis (Double Exponential Smoothing), Time-Series Analysis (Double Moving Average), Time-Series Analysis (Holt-Winter's Additive), Time-Series Analysis (Holt-Winter's Multiplicative), Time-Series Analysis (Seasonal Additive), Time-Series Analysis (Seasonal Multiplicative), Time-Series Analysis (Single Exponential Smoothing), Time-Series Analysis (Single Moving Average), Trend Line (Difference Detrended), Trend Line (Exponential Detrended), Trend Line (Exponential), Trend Line (Linear Detrended), Trend Line (Linear), Trend Line (Logarithmic Detrended), Trend Line (Logarithmic), Trend Line (Moving Average Detrended), Trend Line (Moving Average), Trend Line (Polynomial Detrended), Trend Line (Polynomial), Trend Line (Power Detrended), Trend Line (Power), Trend Line (Rate Detrended), Trend Line (Static Mean Detrended), Trend Line (Static Median Detrended), Variance (Population), Variance (Sample), Volatility: EGARCH, Volatility: EGARCH-T, Volatility: GARCH, Volatility: GARCH-M, Volatility: GJR GARCH, Volatility: GJR TGARCH, Volatility: Log Returns Approach, Volatility: TGARCH, Volatility: TGARCH-M, Yield Curve (Bliss), and Yield Curve (Nelson-Siegel).