
Real Options Valuation Inc.
Risk Simulator
Real Options SLS
Modeling Toolkit
ESO Valuation
ROV Modeler
ROV Optimizer
ROV Valuator
ROV Compiler
ROV Extractor
ROV Evaluator
ROV Biz Stats
ROV Dashboard
ROV Scheduler
ROV Charter
ROV Web Models
Certified in Risk Management
Senior Credit Risk Management Certification
Real Options Valuation, Inc. Products & Services Brochure
RISK
RISK

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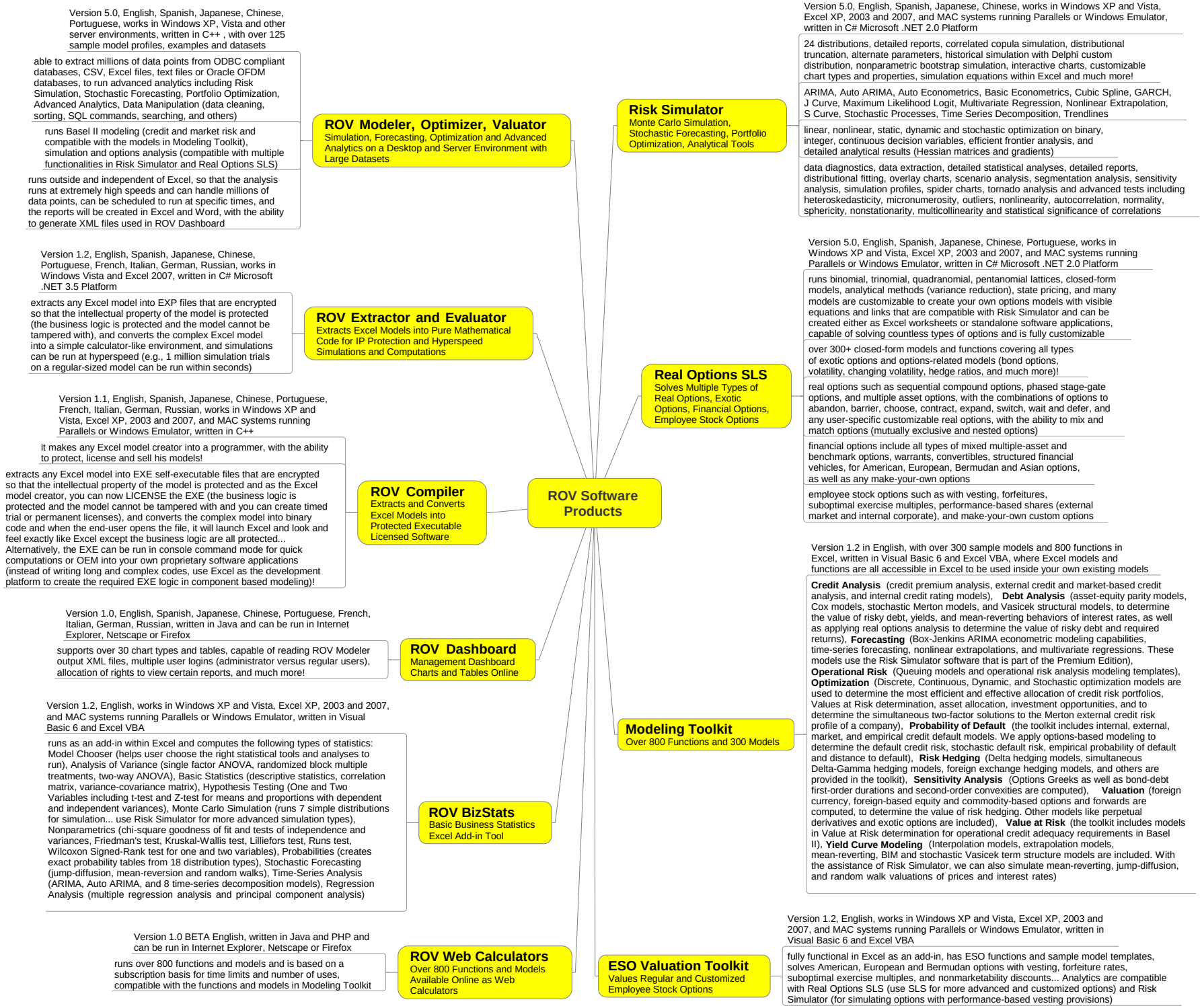
ROV Software Products
ROV Modeler, Optimizer, Valuator
Simulation, Forecasting, Optimization and Advanced Analytics on a Desktop and Server Environment with Large Datasets
Version 5.0, English, Spanish, Japanese, Chinese, Portuguese, works in Windows XP, Vista and other server environments, written in C++ , with over 125 sample model profiles, examples and datasets
able to extract millions of data points from ODBC compliant databases, CSV, Excel files, text files or Oracle OFDM databases, to run advanced analytics including Risk Simulation, Stochastic Forecasting, Portfolio Optimization, Advanced Analytics, Data Manipulation (data cleaning, sorting, SQL commands, searching, and others)
runs Basel II modeling (credit and market risk and compatible with the models in Modeling Toolkit), simulation and options analysis (compatible with multiple functionalities in Risk Simulator and Real Options SLS)
runs outside and independent of Excel, so that the analysis runs at extremely high speeds and can handle millions of data points, can be scheduled to run at specific times, and the reports will be created in Excel and Word, with the ability to generate XML files used in ROV Dashboard
ROV Extractor and Evaluator
Extracts Excel Models into Pure Mathematical Code for IP Protection and Hyperspeed Simulations and Computations
Version 1.2, English, Spanish, Japanese, Chinese, Portuguese, French, Italian, German, Russian, works in Windows Vista and Excel 2007, written in C# Microsoft .NET 3.5 Platform
extracts any Excel model into EXP files that are encrypted so that the intellectual property of the model is protected (the business logic is protected and the model cannot be tampered with), and converts the complex Excel model into a simple calculator-like environment, and simulations can be run at hyperspeed (e.g., 1 million simulation trials on a regular-sized model can be run within seconds)
ROV Compiler
Extracts and Converts Excel Models into Protected Executable Licensed Software
Version 1.1, English, Spanish, Japanese, Chinese, Portuguese, French, Italian, German, Russian, works in Windows XP and Vista, Excel XP, 2003 and 2007, and MAC systems running Parallels or Windows Emulator, written in C++
it makes any Excel model creator into a programmer, with the ability to protect, license and sell his models!
extracts any Excel model into EXE self-executable files that are encrypted so that the intellectual property of the model is protected and as the Excel model creator, you can now LICENSE the EXE (the business logic is protected and the model cannot be tampered with and you can create timed trial or permanent licenses), and converts the complex model into binary code and when the end-user opens the file, it will launch Excel and look and feel exactly like Excel except the business logic are all protected... Alternatively, the EXE can be run in console command mode for quick computations or OEM into your own proprietary software applications (instead of writing long and complex codes, use Excel as the development platform to create the required EXE logic in component based modeling)!
ROV Dashboard
Management Dashboard Charts and Tables Online
Version 1.0, English, Spanish, Japanese, Chinese, Portuguese, French, Italian, German, Russian, written in Java and can be run in Internet Explorer, Netscape or Firefox
supports over 30 chart types and tables, capable of reading ROV Modeler output XML files, multiple user logins (administrator versus regular users), allocation of rights to view certain reports, and much more!
ROV BizStats
Basic Business Statistics Excel Add-in Tool
Version 1.2, English, works in Windows XP and Vista, Excel XP, 2003 and 2007, and MAC systems running Parallels or Windows Emulator, written in Visual Basic 6 and Excel VBA
runs as an add-in within Excel and computes the following types of statistics: Model Chooser (helps user choose the right statistical tools and analyses to run), Analysis of Variance (single factor ANOVA, randomized block multiple treatments, two-way ANOVA), Basic Statistics (descriptive statistics, correlation matrix, variance-covariance matrix), Hypothesis Testing (One and Two Variables including t-test and Z-test for means and proportions with dependent and independent variances), Monte Carlo Simulation (runs 7 simple distributions for simulation... use Risk Simulator for more advanced simulation types), Nonparametrics (chi-square goodness of fit and tests of independence and variances, Friedman's test, Kruskal-Wallis test, Lilliefors test, Runs test, Wilcoxon Signed-Rank test for one and two variables), Probabilities (creates exact probability tables from 18 distribution types), Stochastic Forecasting (jump-diffusion, mean-reversion and random walks), Time-Series Analysis (ARIMA, Auto ARIMA, and 8 time-series decomposition models), Regression Analysis (multiple regression analysis and principal component analysis)
ROV Web Calculators
Over 800 Functions and Models Available Online as Web Calculators
Version 1.0 BETA English, written in Java and PHP and can be run in Internet Explorer, Netscape or Firefox
runs over 800 functions and models and is based on a subscription basis for time limits and number of uses, compatible with the functions and models in Modeling Toolkit
Risk Simulator
Monte Carlo Simulation, Stochastic Forecasting, Portfolio Optimization, Analytical Tools
Version 5.0, English, Spanish, Japanese, Chinese, works in Windows XP and Vista, Excel XP, 2003 and 2007, and MAC systems running Parallels or Windows Emulator, written in C# Microsoft .NET 2.0 Platform
24 distributions, detailed reports, correlated copula simulation, distributional truncation, alternate parameters, historical simulation with Delphi custom distribution, nonparametric bootstrap simulation, interactive charts, customizable chart types and properties, simulation equations within Excel and much more!
ARIMA, Auto ARIMA, Auto Econometrics, Basic Econometrics, Cubic Spline, GARCH, J Curve, Maximum Likelihood Logit, Multivariate Regression, Nonlinear Extrapolation, S Curve, Stochastic Processes, Time Series Decomposition, Trendlines
linear, nonlinear, static, dynamic and stochastic optimization on binary, integer, continuous decision variables, efficient frontier analysis, and detailed analytical results (Hessian matrices and gradients)
data diagnostics, data extraction, detailed statistical analyses, detailed reports, distributional fitting, overlay charts, scenario analysis, segmentation analysis, sensitivity analysis, simulation profiles, spider charts, tornado analysis and advanced tests including heteroskedasticity, micronumerosity, outliers, nonlinearity, autocorrelation, normality, sphericity, nonstationarity, multicollinearity and statistical significance of correlations
Real Options SLS
Solves Multiple Types of Real Options, Exotic Options, Financial Options, Employee Stock Options
Version 5.0, English, Spanish, Japanese, Chinese, Portuguese, works in Windows XP and Vista, Excel XP, 2003 and 2007, and MAC systems running Parallels or Windows Emulator, written in C# Microsoft .NET 2.0 Platform
runs binomial, trinomial, quadranomial, pentanomial lattices, closed-form models, analytical methods (variance reduction), state pricing, and many models are customizable to create your own options models with visible equations and links that are compatible with Risk Simulator and can be created either as Excel worksheets or standalone software applications, capable of solving countless types of options and is fully customizable
over 300+ closed-form models and functions covering all types of exotic options and options-related models (bond options, volatility, changing volatility, hedge ratios, and much more)!
real options such as sequential compound options, phased stage-gate options, and multiple asset options, with the combinations of options to abandon, barrier, choose, contract, expand, switch, wait and defer, and any user-specific customizable real options, with the ability to mix and match options (mutually exclusive and nested options)
financial options include all types of mixed multiple-asset and benchmark options, warrants, convertibles, structured financial vehicles, for American, European, Bermudan and Asian options, as well as any make-your-own options
employee stock options such as with vesting, forfeitures, suboptimal exercise multiples, performance-based shares (external market and internal corporate), and make-your-own custom options
Modeling Toolkit
Over 800 Functions and 300 Models
Version 1.2 in English, with over 300 sample models and 800 functions in Excel, written in Visual Basic 6 and Excel VBA, where Excel models and functions are all accessible in Excel to be used inside your own existing models
Credit Analysis (credit premium analysis, external credit and market-based credit analysis, and internal credit rating models), Debt Analysis (asset-equity parity models, Cox models, stochastic Merton models, and Vasicek structural models, to determine the value of risky debt, yields, and mean-reverting behaviors of interest rates, as well as applying real options analysis to determine the value of risky debt and required returns), Forecasting (Box-Jenkins ARIMA econometric modeling capabilities, time-series forecasting, nonlinear extrapolations, and multivariate regressions. These models use the Risk Simulator software that is part of the Premium Edition), Operational Risk (Queuing models and operational risk analysis modeling templates), Optimization (Discrete, Continuous, Dynamic, and Stochastic optimization models are used to determine the most efficient and effective allocation of credit risk portfolios, Values at Risk determination, asset allocation, investment opportunities, and to determine the simultaneous two-factor solutions to the Merton external credit risk profile of a company), Probability of Default (the toolkit includes internal, external, market, and empirical credit default models. We apply options-based modeling to determine the default credit risk, stochastic default risk, empirical probability of default and distance to default), Risk Hedging (Delta hedging models, simultaneous Delta-Gamma hedging models, foreign exchange hedging models, and others are provided in the toolkit), Sensitivity Analysis (Options Greeks as well as bond-debt first-order durations and second-order convexities are computed), Valuation (foreign currency, foreign-based equity and commodity-based options and forwards are computed, to determine the value of risk hedging. Other models like perpetual derivatives and exotic options are included), Value at Risk (the toolkit includes models in Value at Risk determination for operational credit adequacy requirements in Basel II), Yield Curve Modeling (Interpolation models, extrapolation models, mean-reverting, BIM and stochastic Vasicek term structure models are included. With the assistance of Risk Simulator, we can also simulate mean-reverting, jump-diffusion, and random walk valuations of prices and interest rates)
ESO Valuation Toolkit
Values Regular and Customized Employee Stock Options
Version 1.2, English, works in Windows XP and Vista, Excel XP, 2003 and 2007, and MAC systems running Parallels or Windows Emulator, written in Visual Basic 6 and Excel VBA
fully functional in Excel as an add-in, has ESO functions and sample model templates, solves American, European and Bermudan options with vesting, forfeiture rates, suboptimal exercise multiples, and nonmarketability discounts... Analytics are compatible with Real Options SLS (use SLS for more advanced and customized options) and Risk Simulator (for simulating options with performance-based vesting provisions)

RISK SIMULATOR

RISK SIMULATOR 5.0

Monte Carlo Simulation

25 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, Truncation, Alternate Parameters, Linking capabilities, Multidimensional Simulations and Risk Simulator functions in Excel

Analytical Tools

Bootstrapping, Cluster Segmentation, Comprehensive Reports, Data Extraction, Data Import, Data Diagnostics, Distributional Fitting, Distributional Probabilities (PDF, CDF, ICDF), Hypothesis Testing, Overlay Charts, Sensitivity Analysis, Scenario Analysis, Statistical Analytics, Tornado and Spider Charts

Forecasting

Box-Jenkins ARIMA, Auto ARIMA, Basic Econometrics, Auto Econometrics, Cubic Spline, Custom Distributions, GARCH, J Curve, S Curve, Markov Chain, Maximum Likelihood, Multiple Regression, Nonlinear Extrapolation, Stochastic Processes, Time-Series Decomposition, Trendlines

Optimization

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

Real Options Valuation, Inc.

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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

25 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, Truncation, Alternate Parameters, Linking capabilities, Multidimensional Simulations and Risk Simulator functions in Excel.

Analytical Tools

Bootstrapping, Cluster Segmentation, Comprehensive Reports, Data Extraction, Data Import, Detailed Data Diagnostics, Distributional Fitting, Distributional Exact Probabilities (PDF, CDF, ICDF), Hypothesis Testing, Dynamic Sensitivity Analysis, Scenario Analysis, Tornado and Spider Charts and more!

Forecasting

Box-Jenkins ARIMA, Auto ARIMA, Basic Econometrics, Auto Econometrics, Cubic Spline, Customized Distributions, GARCH Volatility, J Curve, S Curve, Markov Chains, Maximum Likelihood Estimations (Logit), 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

- 5 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 indispensible 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.

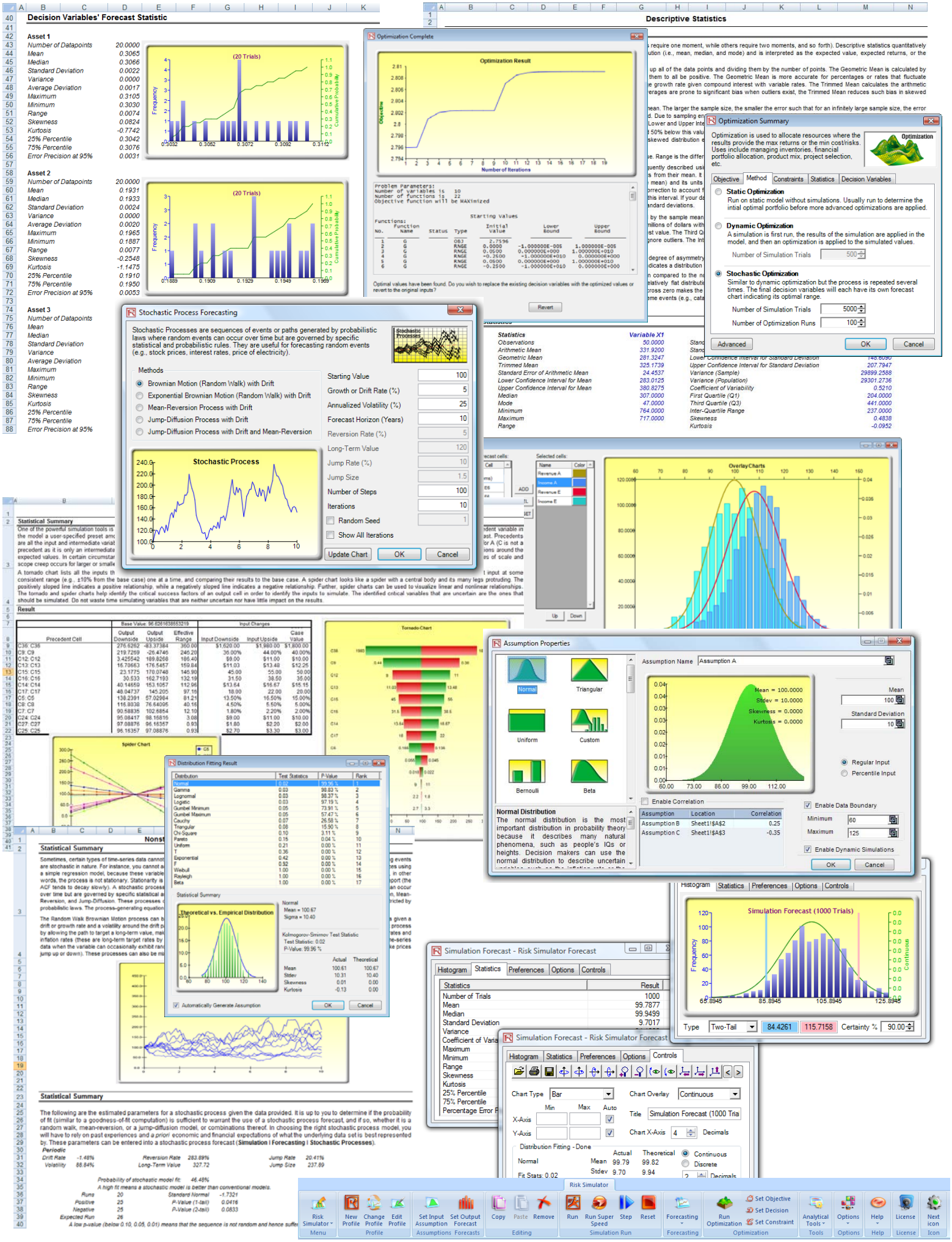
The ***Certified in Risk Management (CRM)*** seminar is a four-day hands-on class that covers the materials on our Risk Analysis and Real Options for Analysts courses and geared towards the CRM certification provided by the International Institute of Professional Education and Research (AACSB member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

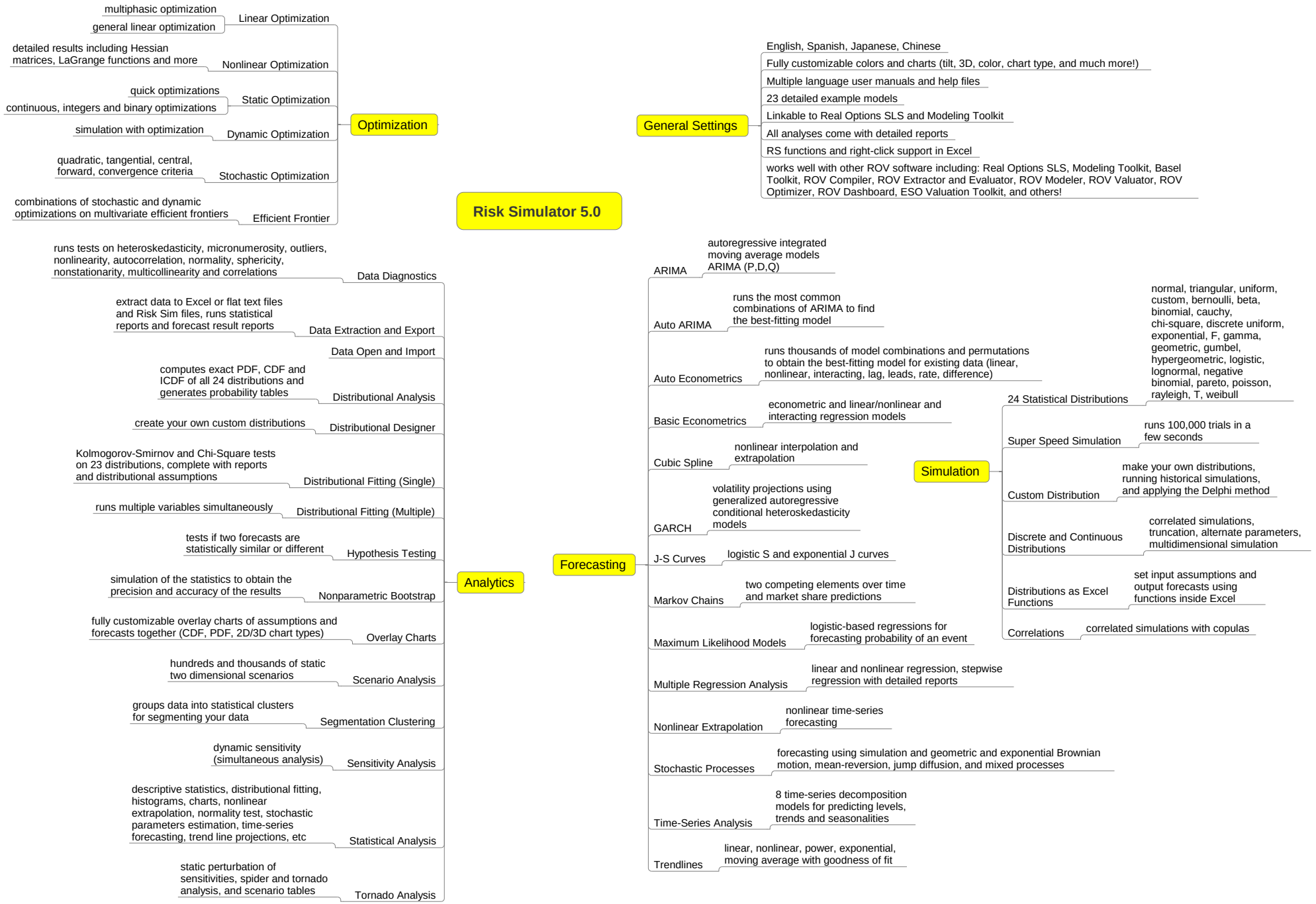
Our ***Risk Analysis for Senior Managers*** is a one day course specially designed for senior executives, where we will review case studies in risk management from 3M, Airbus, Boeing, GE, and many others. It provides an executive overview of risk analysis, strategic real options, portfolio optimization, 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 *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); *Modeling Risk: Applying Monte Carlo Simulation, Real Options Analysis, Forecasting and Optimization* (Wiley, 2006); *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).


Decision Variables' Forecast Statistic
Asset 1
Number of Datapoints 20.0000
Mean 0.3065
Median 0.3066
Standard Deviation 0.0022
Variance 0.0000
Average Deviation 0.0017
Maximum 0.3105
Minimum 0.3030
Range 0.0074
Skewness 0.0824
Kurtosis -0.7742
25% Percentile 0.3042
75% Percentile 0.3076
Error Precision at 95% 0.0031
(20 Trials)
Asset 2
Number of Datapoints 20.0000
Mean 0.1931
Median 0.1933
Standard Deviation 0.0024
Variance 0.0000
Average Deviation 0.0020
Maximum 0.1965
Minimum 0.1887
Range 0.0077
Skewness -0.2548
Kurtosis -1.1475
25% Percentile 0.1910
75% Percentile 0.1950
Error Precision at 95% 0.0053
(20 Trials)
Asset 3
Number of Datapoints
Mean
Median
Standard Deviation
Variance
Average Deviation
Maximum
Minimum
Range
Skewness
Kurtosis
25% Percentile
75% Percentile
Error Precision at 95%
Frequency
Cumulative Probability
Optimization Complete
Optimization Result
Objective
Number of Iterations
Problem Parameters:
Number of variables is 10
Number of functions is 22
Objective function will be MAXimized
Starting values
Functions:
Function No.
Name
Status
Type
Initial Value
Lower Bound
Upper Bound
Optimal values have been found. Do you wish to replace the existing decision variables with the optimized values or revert to the original inputs?
Revert
Optimization Summary
Optimization is used to allocate resources where the results provide the max returns or the min cost/risks. Uses include managing inventories, financial portfolio allocation, product mix, project selection, etc.
Optimization
Objective
Method
Constraints
Statistics
Decision Variables
Static Optimization
Run on static model without simulations. Usually run to determine the intial optimal portfolio before more advanced optimizations are applied.
Dynamic Optimization
A simulation is first run, the results of the simulation are applied in the model, and then an optimization is applied to the simulated values.
Number of Simulation Trials 500
Stochastic Optimization
Similar to dynamic optimization but the process is repeated several times. The final decision variables will each have its own forecast chart indicating its optimal range.
Number of Simulation Trials 5000
Number of Optimization Runs 100
Advanced
OK
Cancel
Descriptive Statistics
Statistics
Variable X1
Observations 50.0000
Arithmetic Mean 331.9200
Geometric Mean 281.3247
Trimmed Mean 325.1739
Standard Error of Arithmetic Mean 24.4537
Lower Confidence Interval for Mean 283.0125
Upper Confidence Interval for Mean 380.8275
Median 307.0000
Mode 47.0000
Minimum 764.0000
Maximum 717.0000
Range
Variance (Sample) 29899.2588
Variance (Population) 29301.2736
Coefficient of Variability 0.5210
First Quartile (Q1) 204.0000
Third Quartile (Q3) 441.0000
Inter-Quartile Range 237.0000
Skewness 0.4838
Kurtosis -0.0952
Stochastic Process Forecasting
Stochastic Processes are sequences of events or paths generated by probabilistic laws where random events can occur over time but are governed by specific statistical and probabilistic rules. They are useful for forecasting random events (e.g., stock prices, interest rates, price of electricity).
Stochastic Processes
Methods
Brownian Motion (Random Walk) with Drift
Exponential Brownian Motion (Random Walk) with Drift
Mean-Reversion Process with Drift
Jump-Diffusion Process with Drift
Jump-Diffusion Process with Drift and Mean-Reversion
Starting Value 100
Growth or Drift Rate (%) 5
Annualized Volatility (%) 25
Forecast Horizon (Years) 10
Reversion Rate (%) 5
Long-Term Value 120
Jump Rate (%) 10
Jump Size 1.5
Number of Steps 100
Iterations 10
Random Seed
Show All Iterations
Update Chart
OK
Cancel
Stochastic Process
Statistical Summary
Result
Tornado Chart
Spider Chart
Distribution Fitting Result
Assumption Properties
Assumption Name
Assumption A
Normal
Triangular
Uniform
Custom
Bernoulli
Beta
Mean = 100.0000
Stdev = 10.0000
Skewness = 0.0000
Kurtosis = 0.0000
Mean
Standard Deviation
Regular Input
Percentile Input
Enable Correlation
Enable Data Boundary
Minimum
Maximum
Enable Dynamic Simulations
Normal Distribution
The normal distribution is the most important distribution in probability theory because it describes many natural phenomena, such as people's IQs or heights. Decision makers can use the normal distribution to describe uncertain
Simulation Forecast - Risk Simulator Forecast
Histogram
Statistics
Preferences
Options
Controls
Number of Trials 1000
Mean 99.7877
Median 99.9499
Standard Deviation 9.7017
Maximum
Minimum
Range
Skewness
Kurtosis
25% Percentile
75% Percentile
Simulation Forecast (1000 Trials)
Frequency
Type Two-Tail 84.4261 115.7158 Certainty % 90.00
Chart Type Bar
Chart Overlay Continuous
Title Simulation Forecast (1000 Tria
X-Axis
Y-Axis
Chart X-Axis 4 Decimals
Distribution Fitting - Done
Normal
Actual
Theoretical
Mean 99.79 99.82
Stdev 9.70 9.94
Continuous
Discrete
Fit Stats: 0.02
Statistical Summary
Risk Simulator
Menu
Profile
Assumptions
Forecasts
Editing
Simulation Run
Forecasting
Optimization
Tools
Options
Help
License
Next icon


Risk Simulator 5.0
Optimization
Linear Optimization
multiphasic optimization
general linear optimization
Nonlinear Optimization
detailed results including Hessian matrices, LaGrange functions and more
Static Optimization
quick optimizations
continuous, integers and binary optimizations
Dynamic Optimization
simulation with optimization
Stochastic Optimization
quadratic, tangential, central, forward, convergence criteria
Efficient Frontier
combinations of stochastic and dynamic optimizations on multivariate efficient frontiers
General Settings
English, Spanish, Japanese, Chinese
Fully customizable colors and charts (tilt, 3D, color, chart type, and much more!)
Multiple language user manuals and help files
23 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!
Analytics
Data Diagnostics
runs tests on heteroskedasticity, micronumerosity, outliers, nonlinearity, autocorrelation, normality, sphericity, nonstationarity, multicollinearity and correlations
Data Extraction and Export
extract data to Excel or flat text files and Risk Sim files, runs statistical reports and forecast result reports
Data Open and Import
Distributional Analysis
computes exact PDF, CDF and ICDF of all 24 distributions and generates probability tables
Distributional Designer
create your own custom distributions
Distributional Fitting (Single)
Kolmogorov-Smirnov and Chi-Square tests on 23 distributions, complete with reports and distributional assumptions
Distributional Fitting (Multiple)
runs multiple variables simultaneously
Hypothesis Testing
tests if two forecasts are statistically similar or different
Nonparametric Bootstrap
simulation of the statistics to obtain the precision and accuracy of the results
Overlay Charts
fully customizable overlay charts of assumptions and forecasts together (CDF, PDF, 2D/3D chart types)
Scenario Analysis
hundreds and thousands of static two dimensional scenarios
Segmentation Clustering
groups data into statistical clusters for segmenting your data
Sensitivity Analysis
dynamic sensitivity (simultaneous analysis)
Statistical Analysis
descriptive statistics, distributional fitting, histograms, charts, nonlinear extrapolation, normality test, stochastic parameters estimation, time-series forecasting, trend line projections, etc
Tornado Analysis
static perturbation of sensitivities, spider and tornado analysis, and scenario tables
Forecasting
ARIMA
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
J-S Curves
logistic S and exponential J curves
Markov Chains
two competing elements over time and market share predictions
Maximum Likelihood Models
logistic-based regressions for forecasting probability of an event
Multiple Regression Analysis
linear and nonlinear regression, stepwise regression with detailed reports
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, exponential, moving average with goodness of fit
Simulation
24 Statistical Distributions
normal, triangular, uniform, custom, bernoulli, beta, binomial, cauchy, chi-square, discrete uniform, exponential, F, gamma, geometric, gumbel, hypergeometric, logistic, lognormal, negative binomial, pareto, poisson, rayleigh, T, weibull
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

WHAT'S NEW IN RISK SIMULATOR 5.0

The following lists the new enhancements and tools available in the latest version of Risk Simulator, as well as enhancements from previous versions:

- **Version 5 Enhancements:**
  - **Super Speed Simulation**: This new capability allows you to run simulations at super speeds by first analyzing your Excel model and then compiling the model into pure mathematical code and running the simulations at very high speeds. Certain models that cannot be compiled will be run at regular speed (e.g., models with VBA functions and macros, links to external data or files, unsupported or wrong functions, and errors in the model).
  - **Revised Icons in Excel 2007**: For users with Excel 2007, you will see a completely reworked icon toolbar that is more intuitive and user friendly. There will be four sets of icons that fit most screen resolutions (1280 x 760 and above).
  - **Enhanced Forecast Charts**: The forecast charts now have the following enhancements:
    - **Truncated Statistics**. If you perform some data filtering in the forecast chart (Data Filter section in the Options tab), the Statistics tab will show the updated statistics based on the truncated data set. If you do not truncate the forecast data, the full dataset's statistics will be shown as usual.
    - **Chart Controls (3D/Tilt/Move, Colors, Fitting, PDF/CDF)**. This is a new tab within the forecast chart whereby you can modify the existing forecast charts including performing distributional fitting on the forecast data set, create overlay PDF/CDF/ICDF charts, change the chart options (chart types, 3D rotation, colors, zoom, tilt, number of decimals, minimum and maximum values to chart on the axes, title name, and many other options, including the ability to save the revised settings and print the chart in various formats).
  - **Auto Econometrics**: This new forecasting tool is used to run hundreds and even thousands of model combinations and permutations using smart heuristics to determine the best-fitting model for your data, by testing linear, nonlinear, lagged, lead, interacting, nested and other models. This tool is the counterpart to the ROV Risk Modeler software's detailed autoeconometrics, which is capable of running hundreds of thousands to a few million models on large datasets.
  - **Basic Econometrics**: The existing forecasting tool is now enhanced with new capabilities including the ability to create new variables and functions such as TIME (a linear time-series variable), DIFF (first differencing the time-series data set), RESIDUAL (data from the error term of a forecast equation you specify), RATE (first order ratio of time-series data), and FORECAST (data from the error term of a forecast equation you specify).
  - **Trendline Analysis**: This new tool runs the most common trendlines including linear, nonlinear, exponential, power, moving average, and polynomial models, returns a series of charts as well as the goodness-of-fit statistics for each model.
  - **Overlay Charts**: This new charting tool is used to compare multiple assumptions and/or forecast variables, by plotting them in a time-series or cross-sectional overlay manner. This allows you to quickly view the similarities and differences in the assumptions and forecasts in easy to read charts.
  - **Segmentation Clustering**: This tool is capable of segregating and clustering or grouping a large set of data into different natural statistical groups by applying some smart algorithms and heuristics.

- **Create Forecast Statistics Table**: This new tool can create reports of just the key forecast statistics (e.g., mean, median mode, standard deviation, variance, coefficient of variation, skew, kurtosis) as well as confidence levels and probabilities of the output forecast variables you select. The result is a comparison table listing the selected statistics across multiple forecasts.
- **Flexible Licensing**: There are several new enhancements to our licensing:
  - Vista users with the user access control turned on or limited users without administrative logins will still be able to enjoy the full functionalities of Risk Simulator by being able to install the software licenses without doing any additional work. To install a new license file you received, simply start Excel, click on Risk Simulator, License, Install License and browse to the license file you are provided to activate the software permanently or for a longer trial period).
  - Risk Simulator now has the capability of turning on or off certain functionalities 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 only activates the forecasting tools whereas the other modules are deactivated, thereby saving some costs on the software. The four modules that can be turned on or off include Simulation, Forecasting, Optimization and Analytical Tools. In addition, specific tools in each module can also be turned on or off. This customization is only available for site licenses of more than 10 computers.

- **Advanced Forecasting Models**: Together with the new forecasting tools and techniques in version 5.0, Risk Simulator now has the following forecasting methodologies:
  i. **ARIMA (Autoregressive Integrated Moving Average)**
  ii. **Auto ARIMA**
  iii. **Auto Econometrics**
  iv. **Basic Econometrics**
  v. **Cubic Spline**
  vi. **GARCH (Generalized Autoregressive Conditional Heteroskedasticity)**
  vii. **J-Curves**
  viii. **Markov Chains**
  ix. **Maximum Likelihood**
  x. **Nonlinear Extrapolation**
  xi. **Regression**
  xii. **S-Curves**
  xiii. **Stochastic Processes**
  xiv. **Time-Series Analysis**
  xv. **Trendlines**

- **General Enhancements in Risk Simulator Version 4 and beyond:**
  - **Excel RS Functions**: You can now access Risk Simulator functions within Excel by clicking on Insert Function anywhere in your spreadsheet and scroll to the functions starting with RS. Here, you can set assumptions as well as obtain the forecast statistics of a forecast variable. For instance, you can run the RSAssumptionNormal function to set a normal distribution assumption to a cell, or RSForecastStatistic to obtain the statistics of a forecast cell. In the set assumption forecast, you can set the placeholder or temporary value that is seen before and after a simulation is run (Value), the name of the assumption (Variable Name), the parameters of the distribution (e.g., Mean, Standard Deviation), as well as other items such as percentile values, correlations, min and max boundaries. For the results, you can also use *RSForecastStatistic(A1, "Percentile99.9")* to

obtain the 99.90 percentile value of cell A1, where this cell has a forecast parameter set. The functions that can be used include: "PercentileXXX", "CertaintyXXX", "Mean", "Median", StandardDeviation", "Variance", "Skewness", and "Kurtosis".

- **Right-Click in Excel**: You can now use the mouse right-click to access quick Risk Simulator items in Excel, such as set assumptions, set forecasts, and run simulation.
- **Percentiles and Conditional Means**: In stochastic optimization, additional statistics are now available, including Percentiles as well as Conditional Means, such as obtaining the mean as long as it is > A or < A, which are critical in computing conditional value at risk measures.
- **Coefficient of Variation (CV)**: The mean absolute deviation value is now changed to CV in the forecast chart's statistics, where CV is the standard deviation divided by the mean, sometimes used as a proxy for volatility, and useful as a relative measure of risk, in comparing different sized projects, as well as being used as a risk-to-return ratio.
- **Scenario Analysis:** This new tool is used to compute various scenarios in your model, by changing one or two input variables at a time, for a range of inputs, to determine the effects on the output.
- **Powerful Tornado**: Additional checklists and options as well as a more stable and powerful Tornado analysis, whereby you can now run Tornado across multiple worksheets, global settings (change one setting such as testing 10% upside and downside, and you can control if individual precedents are changed or the entire set of precedents are changed), highlighting or ignoring possible integer values (sometimes integer values are used as flags in a model and this option helps in identifying potential precedents you may wish to ignore in running the Tornado), worksheet names are now included in the sensitivity tables for easy identification, and other enhancements.
- **Efficient Frontier**: This optimization tool that is capable of running multiple sets of optimizations with changing constraints. You can access this tool through the Set Constraints dialog box in optimization. This technique can be run in concurrence with static, dynamic and stochastic optimization.
- **Re-enable Risk Simulator**: This tool is now available on the ***Start | Programs | Real Options Valuation | Risk Simulator*** menu. This allows you to re-enable the software if Windows or Excel temporarily disables the software (this can occur if there is a power outage when you are running a simulation, a virus or Trojan horse on your computer or you accidentally delete some critical files, and so forth).
- **Multiphasic Optimization**: module now is equipped with a Multiphasic Optimization and a test for Local versus Global Optimum in the "Advanced" options button (available when you run an optimization). These two new features, when used together with the existing advanced features, allows the user to have better control over how the optimization is run, and increases the accuracy and dependency of the results.

- **Statistical Analysis Tool**: Select the data you wish to analyze, including the headers, and start this tool (located at ***Risk Simulator | Tools | Statistical Analysis***), and the following analyses will be available:
  - **Descriptive statistics**, including all 4 moments of the distribution as well as other confidence measures.
  - **Distributional fitting**, to test if the data set can be fitted to any distributions.
  - **Hypothesis test** to verify if the data is statistically significantly similar or different than a specific value.
  - **Nonlinear extrapolation** to test if the data, a time-series, is nonlinear in nature.

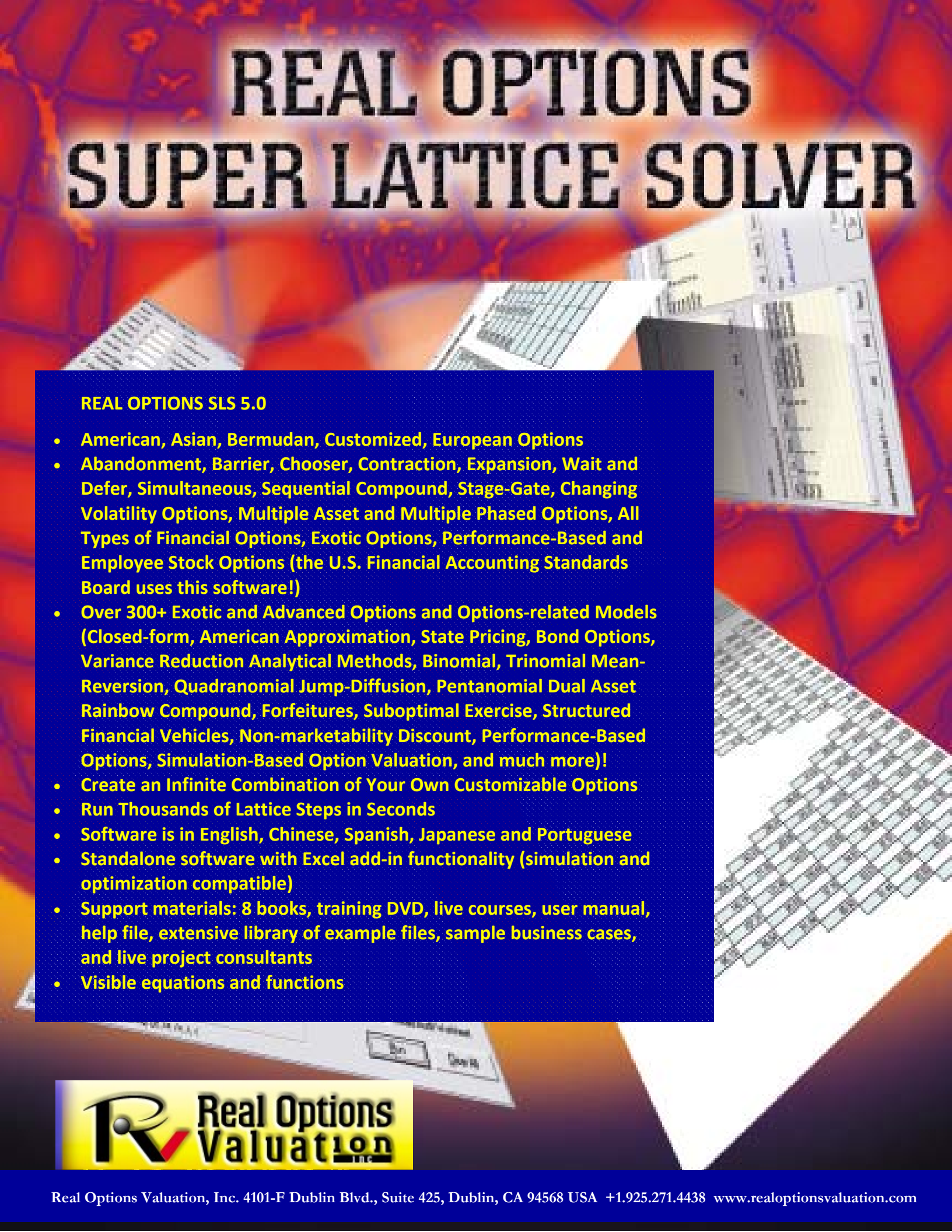
- **Normality** test to see if the data set is statistically close to a normal distribution. This is an important statistical character as hypotheses tests as well as other modeling techniques require the normality assumption.
- **Stochastic parameter estimations**, to find the input parameters for a random walk, mean-reverting process, or jump-diffusion process, and to decide if the variations explained are sufficient to justify the use of the stochastic process forecast.
- **Autocorrelation** tests of the data to see if the history of the time-series data can be used to predict the future.
- **Time-series forecasting**, to test for the baseline shifts, trends, and seasonality effects of the time-series data.
- **Trend analysis**, to test of the data set follows a linear time-trend, and if so, what is the level of predictability.

- **Advanced Data Diagnostic Tool**: Select the data you wish to analyze, including the headers, and start this tool (located at ***Risk Simulator | Tools | Diagnostic Tool***), and the following analyses are available:
  - Heteroskedasticity.
  - Multicollinearity.
  - Micronumerosity.
  - Nonlinearity.
  - Outliers.
  - Autocorrelation.
  - Partial Autocorrelation.
  - Distributive Lag.
  - Normality and Sphericity.
  - Nonstationarity.
  - Stochastic Characteristics.
  - Linear and Nonlinear Correlations.
  - Variance Inflation Factors.
  - Visual Charts.

  These tests are vital before starting with *any* types of forecasting or data analysis procedures. Each test comes complete with an easy-to-understand detailed report so that it does not take a trained econometrician or statistician to understand and interpret the results.

- **Maximum Likelihood**: This is available at (***Risk Simulator | Forecasting | Maximum Likelihood***) where maximum likelihood iterative and internal optimization procedures are used to model binary response variables (the dependent variable is binary, taking on the values of 0 or 1). This is a key discriminant analysis with multiple uses (e.g., determining if patients will develop cancer given some characteristics like age, cigarettes smoked, blood pressure; or to determine if a credit line or person will default on a loan given the company's assets, asset volatility, or the person's age, education level, years at a job, etc).
- **Multi-Language Support**: We have multiple language support, with English (USA), Chinese (Simplified), Spanish, and Japanese, with forthcoming editions with additional languages. Users can switch between languages midway while working on their models by simply clicking on the **Risk Simulator** and **Languages** menu, and restarting Excel.
- **Microsoft .NET Framework 2.0/3.0**: We have completely upgraded our source code to work seamlessly with Microsoft .NET Framework 2.0/3.0. This translates to higher speed and compatibility with newer computers.

REAL OPTIONS SUPER LATTICE SOLVER



REAL OPTIONS SLS 5.0

- American, Asian, Bermudan, Customized, European Options
- Abandonment, Barrier, Chooser, Contraction, Expansion, Wait and Defer, Simultaneous, Sequential Compound, Stage-Gate, Changing Volatility Options, Multiple Asset and Multiple Phased Options, All Types of Financial Options, Exotic Options, Performance-Based and Employee Stock Options (the U.S. Financial Accounting Standards Board uses this software!)
- Over 300+ Exotic and Advanced Options and Options-related Models (Closed-form, American Approximation, State Pricing, Bond Options, Variance Reduction Analytical Methods, Binomial, Trinomial Mean-Reversion, Quadranomial Jump-Diffusion, Pentanomial Dual Asset Rainbow Compound, Forfeitures, Suboptimal Exercise, Structured Financial Vehicles, Non-marketability Discount, Performance-Based Options, Simulation-Based Option Valuation, and much more)!
- Create an Infinite Combination of Your Own Customizable Options
- Run Thousands of Lattice Steps in Seconds
- Software is in English, Chinese, Spanish, Japanese and Portuguese
- Standalone software with Excel add-in functionality (simulation and optimization compatible)
- Support materials: 8 books, training DVD, live courses, user manual, help file, extensive library of example files, sample business cases, and live project consultants
- Visible equations and functions

Real Options Valuation Inc.

Real Options Valuation, Inc. 4101-F Dublin Blvd., Suite 425, Dublin, CA 94568 USA +1.925.271.4438 www.realoptionsvaluation.com

REAL OPTIONS SUPER LATTICE SOFTWARE (SLS)

Move beyond the academic papers and theoretical realm, and start applying real options with this new software. Real Options SLS is a standalone software and spreadsheet accessible add-in for analyzing and valuing real options, financial options, exotic options and employee stock options and incorporating them into custom spreadsheet models. The newly designed customized option modules allow you to create your own à la carte fully customized models, where all the mathematical equations and functions are visible, thus demystifying the approach and results, making them easier to understand and explain.

SOFTWARE FUNCTIONALITY, ALGORITHMS AND MODELS

- Solves Real Options such as sequential compound options, phased stage-gate options, and multiple asset options, with the combinations of options to abandon, barrier, choose, contract, expand, switch, wait and defer, and any user-specific customizable real options, with the ability to mix and match options (mutually exclusive and nested options)
- Solves Financial Options including mixed multiple assets, benchmark options, warrants, convertibles, structured financial vehicles, combined with American, European, Bermudan and Asian options, and any make-your-own options
- Solves Employee Stock Options with vesting, forfeitures, suboptimal exercise multiples, performance-based shares (external market or internal corporate), and make-your-own custom options
- This is the same software used by the U.S. Financial Accounting Standards Board when creating their FAS 123R in 2004
- You can create your own option models using predefined equations or your own equations, where a 1000-step binomial lattice can be computed in a few seconds (something that if done manually will take hundreds of years on a computer), and also has closed-form model benchmark models from Black-Scholes-Merton to other advanced closed-form American models
- Available in English, Spanish, Japanese, Chinese, Portuguese, and has multiple language detailed User Manuals with sample case studies and step-by-step modeling techniques and solutions as well as 80 detailed example models
- Runs Binomial, Trinomial (mean-reverting options), Quadranomial (jump-diffusion options), Pentanomial (rainbow compound options) models as well as over 300+ closed-form advanced options models (state-pricing models, analytical methods, volatility computations, variance reduction, American approximation models, options valuation via simulation techniques, all types of bond-options and convertible warrants, changing volatility options, other options-related models and much more!)
- SLS is fully functional in Excel, where you can run Monte Carlo risk simulation on your option models, link to and from other existing Excel models, and apply other advanced analytics like Risk Simulator's Monte Carlo simulation, optimization, stochastic forecasting and VBA macros
- The generated lattices' equations and functions in Excel are fully visible with a live model with links and equations...
- It is a powerful options modeling learning tool
- SLS is a fully customizable modeling tool, with the ability to enter in your own options equations
- Leverage existing static NPV analysis to add financial sophistication including dynamic simulation, real options analysis, and optimization and you can use a framework for identifying, valuing, selecting, and prioritizing the right projects to gain additional insights into strategic value and management flexibility in decision making
- You can correctly evaluate a project's strategic intrinsic value and eliminate the possibility of undervaluing the strategic value of certain projects, identify, frame, and value future strategic opportunities, and incorporate new decisions over time, as opposed to NPV's requirement that all decisions be defined at the outset by analyzing multiple strategic decision pathways, as opposed to NPV's single decision pathway
- The SLS software is a reliable, repeatable, and consistent process for decision making within a user-friendly software with powerful analysis tools to solve problems that cannot be otherwise solved
- 8 books on risk analysis, real options, and options valuation written by the software's creator, a set of Training DVD on real options and risk analysis (simulation, forecasting, optimization, real options, and applied statistics)

TRIAL AND ACADEMIC VERSIONS

Real Options SLS software 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 indispensible 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 Real Options SLS or our company's 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.

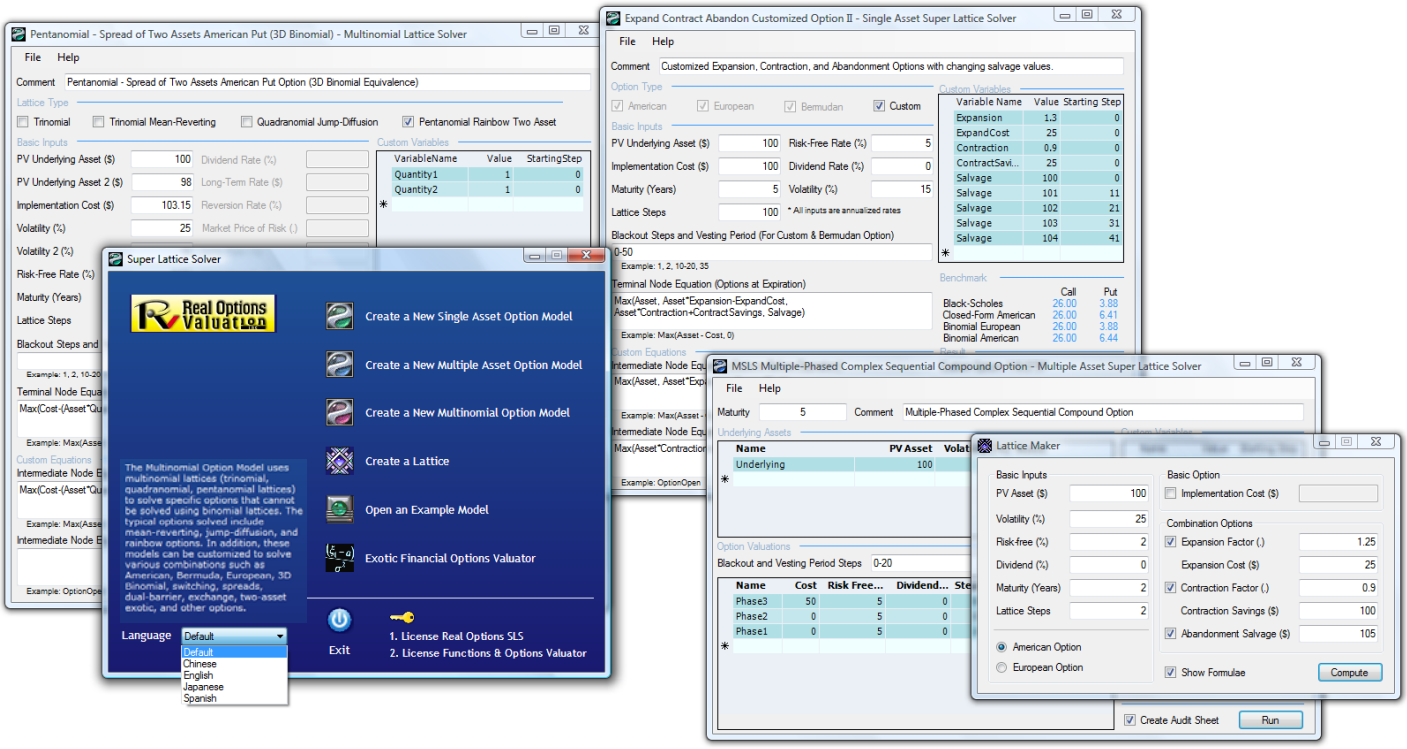
The ***Certified in Risk Management (CRM)*** seminar is a four-day hands-on class that covers the materials on our Risk Analysis and Real Options for Analysts courses and geared towards the CRM certification provided by the International Institute of Professional Education and Research (AACSB member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

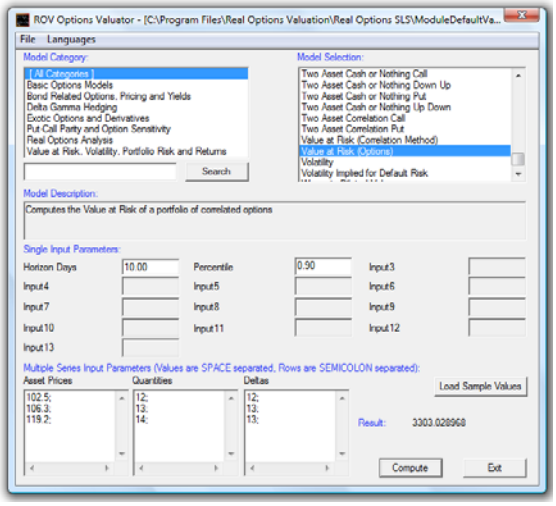
Our ***Risk Analysis for Senior Managers*** is a one day course specially designed for senior executives, where we will review case studies in risk management from 3M, Airbus, Boeing, GE, and many others. It provides an executive overview of risk analysis, strategic real options, portfolio optimization, 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, 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 *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); *Modeling Risk: Applying Monte Carlo Simulation, Real Options Analysis, Forecasting and Optimization* (Wiley, 2006); *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 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).


Pentanomial - Spread of Two Assets American Put (3D Binomial) - Multinomial Lattice Solver
Expand Contract Abandon Customized Option II - Single Asset Super Lattice Solver
Super Lattice Solver
Real Options Valuation
Create a New Single Asset Option Model
Create a New Multiple Asset Option Model
Create a New Multinomial Option Model
Create a Lattice
Open an Example Model
Exotic Financial Options Valuator
Exit
1. License Real Options SLS
2. License Functions & Options Valuator
MSLS Multiple-Phased Complex Sequential Compound Option - Multiple Asset Super Lattice Solver
Lattice Maker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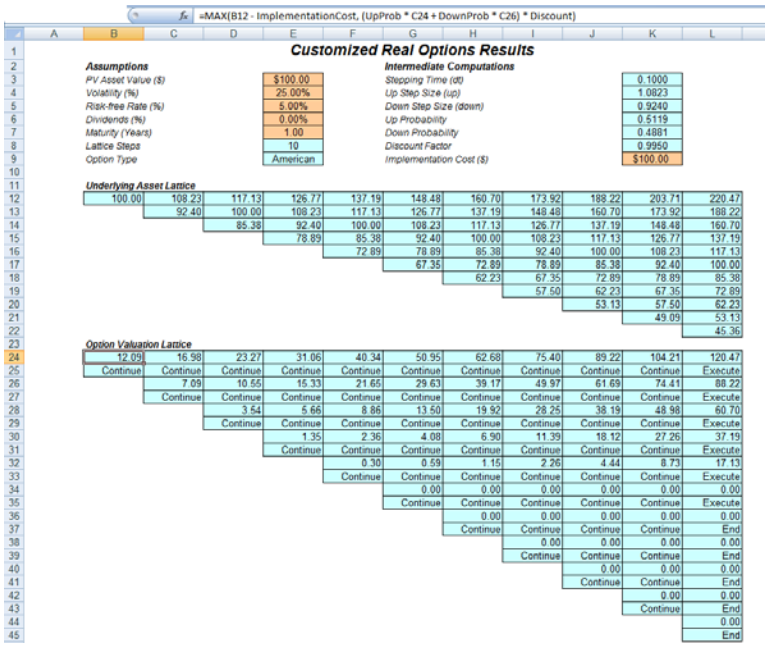
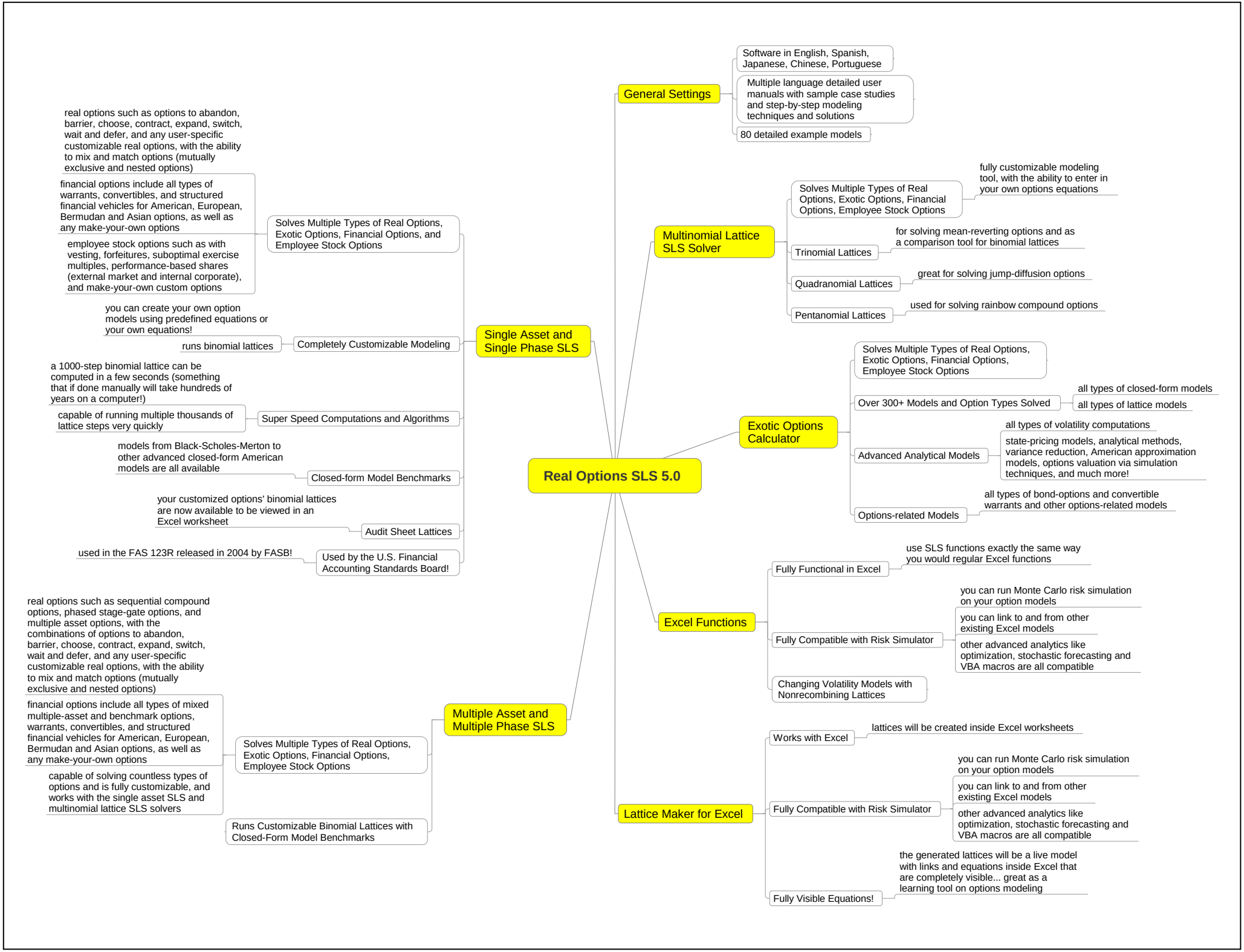

Customized Real Options Results
Assumptions
Intermediate Computations
Underlying Asset Lattice
Option Valuation Lattice


Real Options SLS 5.0
General Settings
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80 detailed example models
Multinomial Lattice SLS Solver
Solves Multiple Types of Real Options, Exotic Options, Financial Options, Employee Stock Options
fully customizable modeling tool, with the ability to enter in your own options equations
Trinomial Lattices
for solving mean-reverting options and as a comparison tool for binomial lattices
Quadranomial Lattices
great for solving jump-diffusion options
Pentanomial Lattices
used for solving rainbow compound options
Exotic Options Calculator
Solves Multiple Types of Real Options, Exotic Options, Financial Options, Employee Stock Options
Over 300+ Models and Option Types Solved
all types of closed-form models
all types of lattice models
Advanced Analytical Models
all types of volatility computations
state-pricing models, analytical methods, variance reduction, American approximation models, options valuation via simulation techniques, and much more!
Options-related Models
all types of bond-options and convertible warrants and other options-related models
Excel Functions
Fully Functional in Excel
use SLS functions exactly the same way you would regular Excel functions
Fully Compatible with Risk Simulator
you can run Monte Carlo risk simulation on your option models
you can link to and from other existing Excel models
other advanced analytics like optimization, stochastic forecasting and VBA macros are all compatible
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Lattice Maker for Excel
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real options such as sequential compound options, phased stage-gate options, and multiple asset options, with the combinations of options to abandon, barrier, choose, contract, expand, switch, wait and defer, and any user-specific customizable real options, with the ability to mix and match options (mutually exclusive and nested options)
financial options include all types of mixed multiple-asset and benchmark options, warrants, convertibles, and structured financial vehicles for American, European, Bermudan and Asian options, as well as any make-your-own options
capable of solving countless types of options and is fully customizable, and works with the single asset SLS and multinomial lattice SLS solvers
Runs Customizable Binomial Lattices with Closed-Form Model Benchmarks
Single Asset and Single Phase SLS
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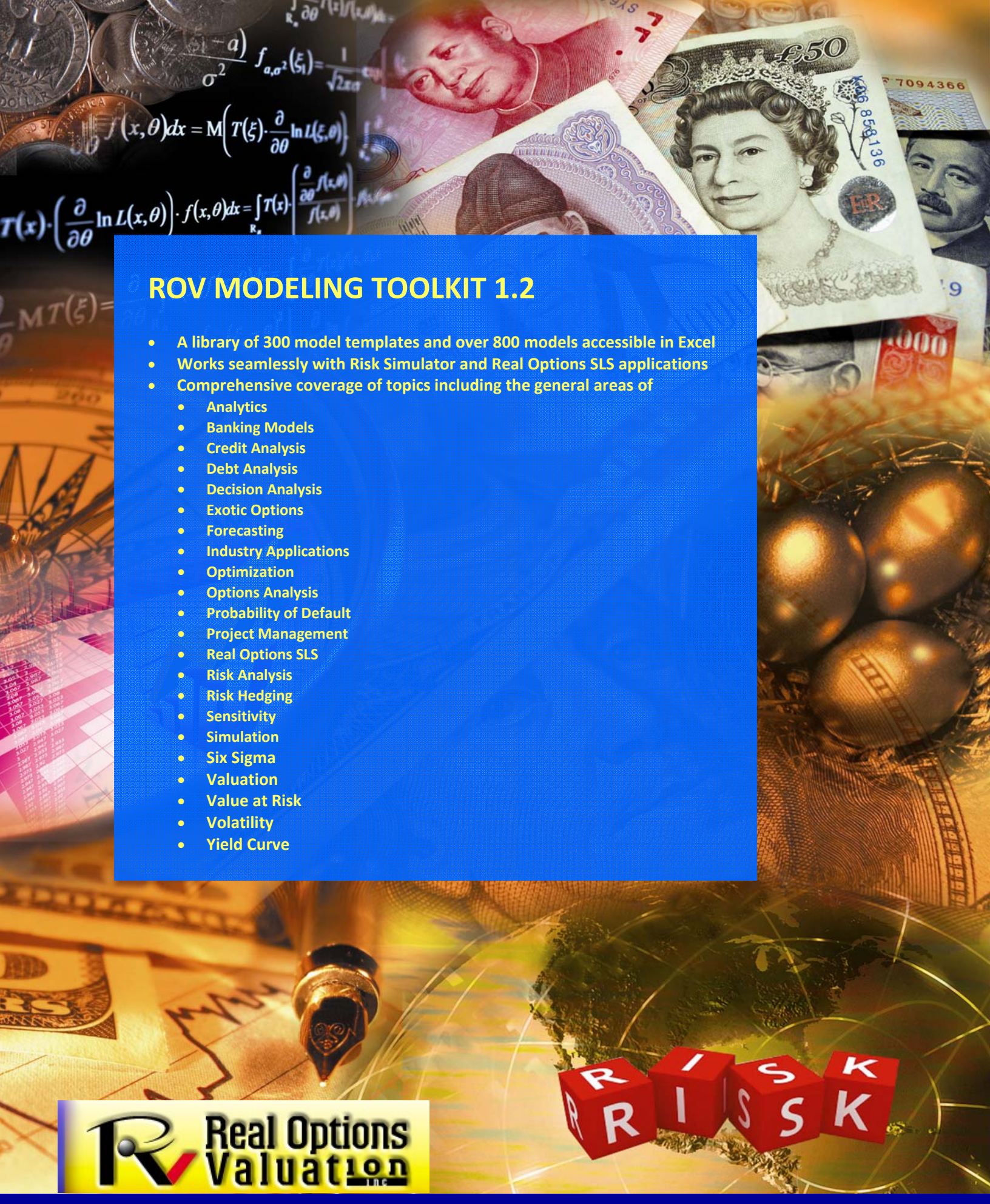
employee stock options such as with vesting, forfeitures, suboptimal exercise multiples, performance-based shares (external market and internal corporate), and make-your-own custom options
Completely Customizable Modeling
you can create your own option models using predefined equations or your own equations!
runs binomial lattices
Super Speed Computations and Algorithms
a 1000-step binomial lattice can be computed in a few seconds (something that if done manually will take hundreds of years on a computer!)
capable of running multiple thousands of lattice steps very quickly
Closed-form Model Benchmarks
models from Black-Scholes-Merton to other advanced closed-form American models are all available
Audit Sheet Lattices
your customized options' binomial lattices are now available to be viewed in an Excel worksheet
Used by the U.S. Financial Accounting Standards Board!
used in the FAS 123R released in 2004 by FASB!



ROV MODELING TOOLKIT 1.2

- A library of 300 model templates and over 800 models accessible in Excel
- Works seamlessly with Risk Simulator and Real Options SLS applications
- Comprehensive coverage of topics including the general areas of
  - Analytics
  - Banking Models
  - Credit Analysis
  - Debt Analysis
  - Decision Analysis
  - Exotic Options
  - Forecasting
  - Industry Applications
  - Optimization
  - Options Analysis
  - Probability of Default
  - Project Management
  - Real Options SLS
  - Risk Analysis
  - Risk Hedging
  - Sensitivity
  - Simulation
  - Six Sigma
  - Valuation
  - Value at Risk
  - Volatility
  - Yield Curve

Real Options Valuation, Inc.

Real Options Valuation, Inc. 4101-F Dublin Blvd., Suite 425, Dublin, CA 94568 USA +1.925.271.4438 www.realoptionsvaluation.com

ROV MODELING TOOLKIT comprises over 800 analytical models, functions and tools, and about 300 analytical model Excel/SLS templates and example spreadsheets covering the areas of risk analysis, simulation, forecasting, Basel II risk analysis, credit and default risk, statistical models, and much more! This toolkit is a set of mathematically sophisticated models written in C++ and linked into Excel spreadsheets. There are a total of over 1100 models, functions, with spreadsheet and SLS templates in this toolkit and the analytical areas covered include:

Analytics: Central Limit Theorem, Central Limit Theorem (Lottery Analysis), Flaw of Averages, Mathematical Integration, Parametric and Nonparametric Hypothesis Tests Dataset, Projectile Motion, Regression Diagnostics, Ships in the Night, Statistical Analysis, Weighting of Ratios

Banking Models: Audit of Construction Lending, Banker's Construction Budget, Classified Breakeven Loan Inventory, Classified Loan Borrowing Base, Classified Loan Cash Budget and Overdraft Facilities, Federal Reserve Camels Rating System, Firm in Financial Distress, Project Finance Risk Rating Model, Queuing Models, Reconciling Enron's Cash Flow, Risk Rating Model, Sample Cash Flows, Sensitivity Projections, Stochastic Loan Pricing Model, Valuation and Appraisal

Credit Analysis: Credit Default Swaps and Credit Spread Options, Credit Default Swaps (with Counterparty Defaults and Correlations), Credit Premium, Credit Risk and Effects on Prices, External Debt Rating and Spreads, Internal Credit Risk Rating Model, Profit Cost Analysis of New Credit, Debt Analysis, Asset Equity Parity Model, Cox Model on Price and Yield of Risky Debt with Mean Reverting Rates, Debt Repayment and Amortization, Debt Sensitivity Models, Merton Price of Risky Debt with Stochastic Asset and Interest, Vasicek Debt Option Valuation, Vasicek Price and Yield of Risky Debt

Decision Analysis: Decision Tree Basics, Decision Tree with EVPI, Minimax and Bayes Theorem, Economic Order Quantity and Inventory Reorder Point, Economic Order Quantity and Optimal Manufacturing, Expected Utility Analysis, Inventory Control, Queuing Models

Exotic Options: American, Bermudan and European Options, Asian Arithmetic, Asian Geometric, Asset or Nothing, Barrier Options, Binary Digital Options, Cash or Nothing, Commodity Options, Complex Chooser, Credit Spread Options, Currency Options, Double Barriers, Exchange Assets, Extreme Spread, Foreign Equity Linked Forex, Foreign Equity Domestic Currency, Foreign Equity Fixed Forex, Foreign Takeover Options, Forward Start, Futures and Forward Options, Gap Options, Graduated Barriers, Index Options, Inverse Gamma Out-of-the-money Options, Jump Diffusion, Leptokurtic and Skewed Options, Lookback Fixed Strike Partial Time, Lookback Fixed Strike, Lookback Floating Strike Partial Time, Lookback Floating Strike, Min and Max of Two Assets, Option Collar, Options on Options, Perpetual Options, Simple Chooser, Spread on Futures, Supershares, Time Switch, Trading Day Corrections, Two Assets Barrier, Two Assets Cash, Two Assets Correlated, Uneven Dividends, Writer Extendible

Forecasting: Brownian Motion Stochastic Process, Data Diagnostics, Econometric, Correlations and Multiple Regression Modeling, Exponential J-Growth Curves, Forecasting Manual Computations, Jump-Diffusion Stochastic Process, Linear Interpolation, Logistic S-Growth Curves, Markov Chains and Market Share, Mean-Reverting Stochastic Process, Multiple Regression, Nonlinear Extrapolation, Stochastic Processes and Yield Curves, Stock Distribution at Horizon, Time-Series Analysis, Time-Series ARIMA

Industry Applications: Asset Liability Management ALM, Biotech: Manufacturing Strategy, Biotech-In-licensing and Deal Structuring, Biotech: Investment Valuation, Electric Utility: Efficient Frontier Generation, Electric Utility: Electricity Contract Risk, Information Technology: Forecasting Use, Information Technology: Decision Analysis, Pensions: Closed Group Portfolio Matching, Pensions: Accounting Modeling and Optimization, Real Estate: Commercial ROI

Optimization: Capital Investments (Part A), Capital Investments (Part B), Continuous Portfolio Allocation, Discrete Project Selection, Inventory Optimization, Investment Portfolio Allocation, Military Portfolio and Efficient Frontier, Optimal Pricing with Elasticity, Optimization of a Harvest Model, Optimizing Ordinary Least Squares, Stochastic Portfolio Allocation

Options Analysis: Binary Digital Instruments, Inverse Floater Bond Lattice Maker, Options Adjusted Spreads on Debt, Options on Debt, Options Trading Strategies

Probability of Default: Empirical (Individuals), External Options Model (Public Company), Merton Internal Model (Private Company), Merton Market Options Model (Industry Comparable), Yields and Spreads (Market Comparable)

Project Management: Cost Estimation Model, Critical Path Analysis (CPM PERT GANTT), Project Timing

Real Options SLS: Employee Stock Options: Simple American Call, Employee Stock Options: Simple Bermudan Call with Vesting, Employee Stock Options: Simple European Call, Employee Stock Options: Suboptimal Exercise, Employee Stock Options: Vesting and Suboptimal Exercise, Employee Stock Options: Vesting, Blackout, Suboptimal, Forfeiture

Exotic Options: American Call Option with Dividends, Exotic Options: Accruals on Basket of Assets, Exotic Options: American Call Option on Foreign Exchange, Exotic Options: American Call Option on Index Futures, Exotic Options: Barrier Option: Down and In Lower Barrier, Exotic Options: Barrier Option: Down and Out Lower Barrier, Exotic Options: Barrier Option: Up and In Upper Barrier Call, Exotic Options: Barrier Option: Up and In, Down and In Double Barrier Call, Exotic Options: Barrier Option: Up and Out Upper Barrier Call, Exotic Options: Barrier Option: Up and Out, Down and Out Double Barrier Call, Exotic Options: Basic American, European, versus Bermudan Call Options, Exotic Options: Chooser Option, Exotic Options: Equity Linked Notes, Exotic Options: European Call Option with Dividends, Exotic Options: Range Accruals

Options Analysis: Plain Vanilla Call Option I, Options Analysis: Plain Vanilla Call Option II, Options Analysis: Plain Vanilla Call Option III, Options Analysis: Plain Vanilla Call Option IV, Options Analysis: Plain Vanilla Put Option

Real Options: Abandonment American Option, Real Options: Abandonment Bermudan Option, Real Options: Abandonment Customized Option, Real Options: Abandonment European Option, Real Options: Contraction American and European Option, Real Options: Contraction Bermudan Option, Real Options: Contraction Customized Option, Real Options: Dual-Asset Rainbow Option Pentanomial Lattice, Real Options: Excel-based Options Models, Real Options: Exotic Complex Floating American Chooser, Real Options: Exotic Complex Floating European Chooser, Real Options: Expand Contract Abandon American and European Option, Real Options: Expand Contract Abandon Bermudan Option, Real Options: Expand Contract Abandon Customized Option I, Real Options: Expand Contract Abandon Customized Option II, Real Options: Expansion American and European Option, Real Options: Expansion Bermudan Option, Real Options: Expansion Customized Option, Real Options: Jump Diffusion Calls and Puts using Quadranomial Lattices, Real Options: Mean Reverting Calls and Puts using Trinomial Lattices, Real Options: Multiple Asset Competing Options (3D Binomial), Real Options: Multiple Phased Complex Sequential Compound Option, Real Options: Multiple Phased Sequential Compound Option, Real Options: Multiple Phased Simultaneous Compound Option, Real Options: Simple Calls and Puts using Trinomial Lattices, Real Options: Simple Two Phased Sequential Compound Option, Real Options: Simple Two Phased Simultaneous Compound Option, Real Options: Strategic Cases: High: Tech Manufacturing Strategy A, Real Options: Strategic Cases: High-Tech Manufacturing Strategy B, Real Options: Strategic Cases: High-Tech Manufacturing Strategy C, Real Options: Strategic Cases: Oil and Gas: Strategy A, Real Options: Strategic Cases: Oil and Gas: Strategy B, Real Options: Strategic Cases: R&D Stage-Gate Process A, Real Options: Strategic Cases: R&D Stage-Gate Process B, Real Options: Strategic Cases: Switching Option's Strategy A, Real Options: Strategic Cases: Switching Option's Strategy B

Trinomial Lattices: American Call Option, Trinomial Lattices: American Put Option, Trinomial Lattices: European Call Option, Trinomial Lattices: European Put Option, Trinomial Lattices: Mean Reverting American Call Option, Trinomial Lattices: Mean Reverting American Put Option, Trinomial Lattices: Mean Reverting European Call Option, Trinomial Lattices: Mean Reverting European Put Option, Trinomial Lattices: Mean Reverting American Abandonment Option, Trinomial Lattices: Mean Reverting American Contraction Option, Trinomial Lattices: Mean Reverting American Expansion Option, Trinomial Lattices: Mean Reverting American Abandonment, Contraction, Expansion, Trinomial Lattices: Mean Reverting Bermudan Abandonment, Contraction, Expansion, Trinomial Lattices: Mean Reverting Abandonment, Contraction, Expansion, Trinomial Lattices: Mean Reverting European Abandonment, Contraction, Expansion

Quadranomial Lattices: Jump Diffusion American Call Option, Quadranomial Lattices: Jump Diffusion American Put Option, Quadranomial Lattices: Jump Diffusion European Call Option, Quadranomial Lattices: Jump Diffusion European Put Option

Pentanomial Lattices: American Rainbow Call Option, Pentanomial Lattices: American Rainbow Put Option, Pentanomial Lattices: Dual Reverse Strike American Call (3D Binomial), Pentanomial Lattices: Dual Reverse Strike American Put (3D Binomial), Pentanomial Lattices: Dual Strike American Call (3D Binomial), Pentanomial Lattices: Dual Strike American Put (3D Binomial), Pentanomial Lattices: European Rainbow Call Option, Pentanomial Lattices: European Rainbow Put Option, Pentanomial Lattices: Exchange of Two Assets American Put (3D Binomial), Pentanomial Lattices: Maximum of Two Assets American Call (3D Binomial), Pentanomial Lattices: Maximum of Two Assets American Put (3D Binomial), Pentanomial Lattices: Minimum of Two Assets American Call (3D Binomial), Pentanomial Lattices: Minimum of Two Assets American Put (3D Binomial), Pentanomial Lattices: Portfolio American Call (3D Binomial), Pentanomial Lattices: Portfolio American Put (3D Binomial), Pentanomial Lattices: Spread of Two Assets American Call (3D Binomial), Pentanomial Lattices: Spread of Two Assets American Put (3D Binomial)

Risk Analysis: Integrated Risk Analysis, Interest Rate Risk, Portfolio Risk and Return Profile

Risk Hedging: Delta Gamma Hedge, Delta Hedge, Effects of Fixed versus Floating Rates, Foreign Exchange Cash Flow Model, Foreign Exchange Exposure Hedging

Sensitivity: Greeks, Tornado and Sensitivity Charts Linear, Tornado and Sensitivity Nonlinear

Simulation: Basic Simulation Model, Best Surgical Team, Correlated Simulation, Correlation Effects Model, Data Fitting, DCF, ROI and Volatility, Debt Repayment and Amortization, Demand Curve and Elasticity Estimation, Infectious Diseases, Recruitment Budget (Negative Binomial and Multidimensional Simulation), Retirement Funding with VBA Macros, Roulette Wheel, Time Value of Money

Six Sigma: Confidence Intervals with Hypothesis Testing, Control Charts (c, n, p, u, X, XmR, R), Delta Precision, Design of Experiments and Combinatorics, Hypothesis Testing and Bootstrap Simulation, Sample Size Correlation, Sample Size DPU, Sample Size Mean, Sample Size Proportion, Sample Size Sigma, Statistical Analysis (CDF, PDF, ICDF) with Hypothesis Testing, Statistical Capability Measures, Unit Capability Measures

Valuation: APT, BETA and CAPM, Buy versus Lease, Caps and Floors, Convertible Bonds, Financial Ratios Analysis, Financial Statements Analysis, Valuation Model, Valuation: Warrant Combined Value, Valuation: Warrant Put Only, Valuation: Warrant Only

Value at Risk: Optimized and Simulated Portfolio VaR, Options Delta Portfolio, Portfolio Operational and Capital Adequacy, Right Tail Capital Requirements, Static Covariance Method

Volatility: EWMA Volatility Models, GARCH Volatility Models, Implied Volatility, Log Asset Returns Approach, Log Cash Flow Returns Approach Probability to Volatility

Yield Curve: CIR Model, Curve Interpolation BIM, Curve Interpolation NS, Forward Rates from Spot Rates, Spline Interpolation and Extrapolation, Term Structure of Volatility, US Treasury Risk Free Rate, Vasicek Model

Employee Stock Options Valuation Toolkit 1.2

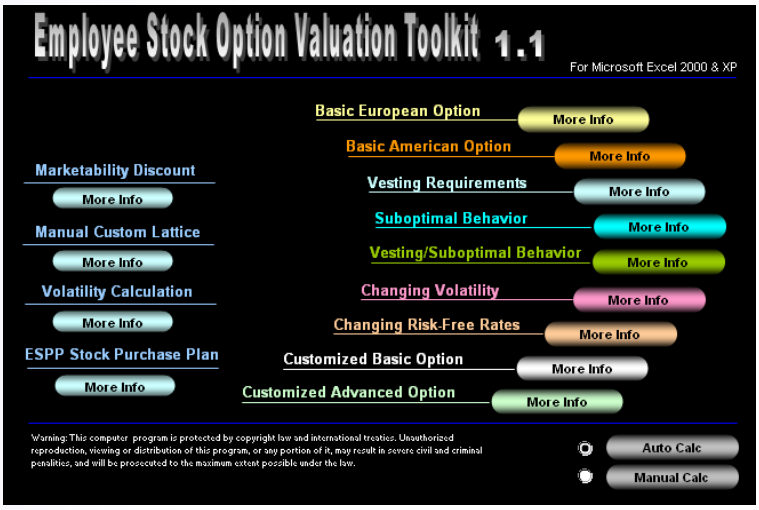
Reduce Employee Stock Option (ESO) expenses by millions of dollars by learning how a FAS 123R-preferred customized binomial lattice is calculated and how it compares to the naïve Black-Scholes. The software creator is an advisor to FASB, and a professor and consultant in financial analytics. The software was used by FASB to create the valuation examples in FAS 123R. See how by considering employee suboptimal exercise behavior, forfeiture rates, blackout periods, vesting, marketability discounts, and changing inputs over time (volatility, dividend yield, risk-free rate, forfeiture rate, and suboptimal behavior exercise multiple) can more accurately reflect reality, reduce expenses, conform to FAS 123R requirements, and pass an audit. See how ESO Valuations are done correctly!

Software and Consulting Highlights

- Software was developed by Dr. Johnathan Mun, advisor to FASB on FAS 123R.
- Use the same software FASB uses! Software was used by FASB to create the valuation example in the 2004 FAS 123R (Section A87).
- Software calculates both closed-form models (Black-Scholes) as well as different binomial and trinomial lattices.
- Theories are all covered extensively in the author's books and articles—use the published books/research to successfully defend an audit.
- All equations are visible within Excel when creating your own option valuation models.
- Costs a lot less than expensive consultants… have the ability to check their work instead!
- Have the ability to compare the naïve Black-Scholes versus more sophisticated binomial lattice results (FASB's preferred method).
- Consulting projects will be implemented by Dr. Johnathan Mun, finance professor, consultant, and author of many well-known books.

Types of Employee Stock Option Conditions Solved

- **Blackout Periods**
- **Changing Forfeiture Rates**
- **Changing Risk-free Rates**
- **Changing Volatilities**
- **Forfeiture Rates (Pre- and Post-vesting)**
- **Stock Price Barrier Requirements**
- **Suboptimal Exercise Behavior Multiple**
- **Vesting Periods**
- **ALL OTHER EXOTIC VARIABLES**



Algorithms Used to Solve Real Options

- **American Closed-Form Models**
- **Binomial and Trinomial Lattices**
- **European Black-Scholes**
- **CREATE YOUR OWN CUSTOM OPTIONS**

Consulting, Training and Modeling

Advanced analytical tools such as ESO Valuation Toolkit might 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, consulting and training are critical. In our consulting services, we provide the client with a results memorandum explaining the inputs into the model, the computations and technical issues in the model, as well as the results and their interpretation. More important, the final deliverables include the report memo as well as Excel-based models and software, in which the client can reuse in future years to re-run the analysis or perform scenario analysis. Finally, training can also be provided to the client's key employees on the use and modeling of ESOs using closed-form models such as the Black-Scholes, as well as binomial lattices. After the training sessions, clients will be able to model ESOs themselves using the ESO Valuation Toolkit software and the accompanying Super Lattice Solver software.

Options Analytics 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 *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 123R* (Wiley Finance, 2004); *Modeling Risk: Applying Monte Carlo Simulation, Real Options Analysis, Forecasting and Optimization* (Wiley, 2006); *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).

FASB Uses This Software!

The figure below shows the solution of the case example provides in Section A87 of the Final 2004 FAS 123R.
Specifically, A87-A88 states:

> *"A87. The following table shows assumptions and information about the share options granted on Jan 1, 20X5.*
> *Share options granted 900,000; Employees granted options 3,000;*
> *Expected forfeitures per year 3.0%; Share price at the grant date $30;*
> *Exercise price $30; Contractual term (CT) of options 10 years;*
> *Risk-free interest rate over CT 1.5 to 4.3%; Expected volatility over CT 40 to 60%;*
> *Expected dividend yield over CT 1.0%; Suboptimal exercise factor 2;*
> *A88. This example assumes that each employee receives an equal grant of 300 options. Using as inputs the last 7 items from the table above, Entity T's lattice-based valuation model produces a fair value of $14.69 per option. A lattice model uses a suboptimal exercise factor to calculate the expected term (that is, the expected term is an output) rather than the expected term being a separate input. If an entity uses a Black-Scholes-Merton option-pricing formula, the expected term would be used as an input instead of a suboptimal exercise factor."*

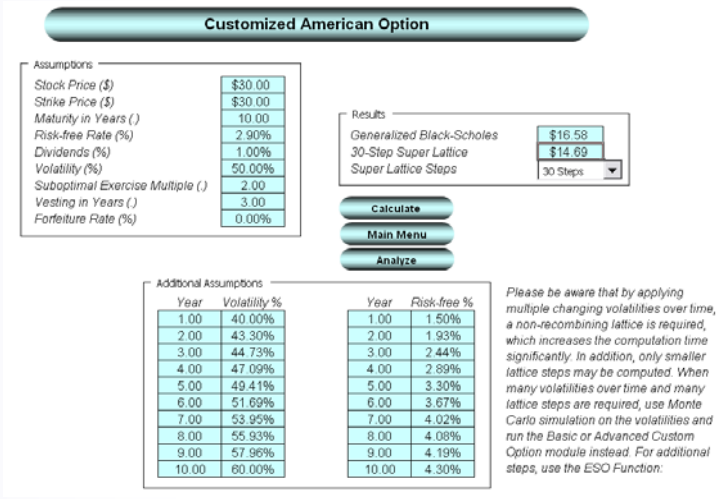
The figure shows the result as $14.69, the answer that FASB uses in its example. The forfeiture rate of 3% used by FASB's example is applied outside of the model to discount for the quantity reduced over time. The software allows the ability to input the forfeiture rates (different pre-vesting and post-vesting forfeiture rates) inside or outside of the model. In this specific example, we set forfeiture rate to zero in the figure below, and the option quantity is adjusted outside, just as FASB does, in A91:

> *"The number of share options expected to vest is estimated at the grant date to be 821,406 (900,000 × .97^3)."*

Testimonials

From the corporations…

"Veritas has modeled the valuation of its employee stock options for analytical purposes using a proprietary customized binomial lattice, developed by Dr. Johnathan Mun. The valuation based on the customized binomial lattice model allows us to take into account the impacts of multiple vesting periods, employee suboptimal exercise behavior, forfeiture rates, changing risk-free rates, and changing volatilities over the life of the option which are required under the 2004 FAS 123R issued by the Financial Accounting Standards Board. It is not possible to consider these factors in a valuation based on the traditional modified Black-Scholes model. Under the assumptions used by Veritas when modeling the valuation of employee stock option grants both based on the customized binomial lattice model as well as the traditional modified Black-Scholes model, the customized binomial lattice model resulted in a considerably lower expense, considering the expensing guidelines as included in the FAS 123R Statement."
—Don Rath, VP of Tax & Stock Admin., Veritas Software Corp.

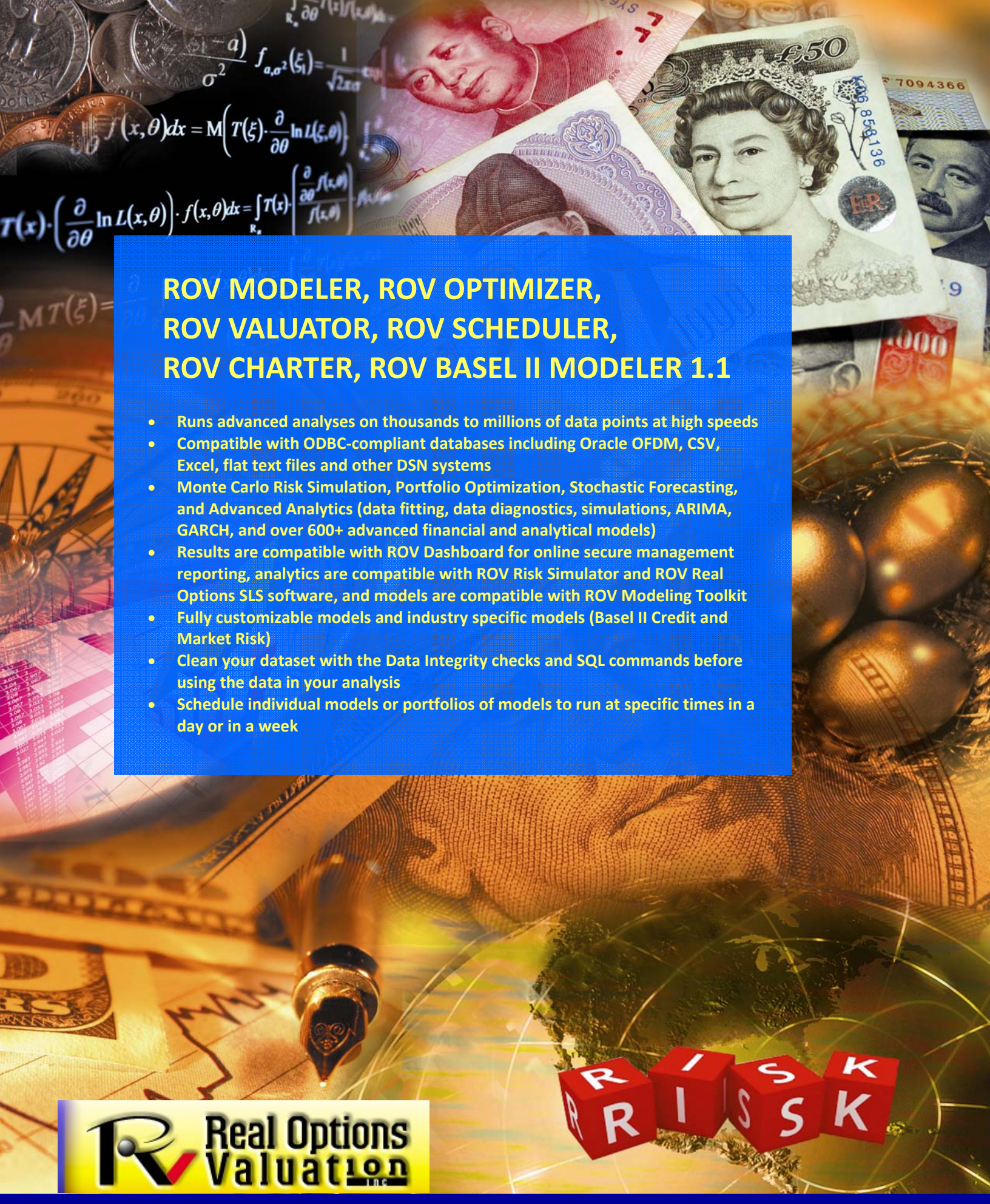


From the consultants…

"This is one of those rare books/software written in anticipation of a major shift in the industry and economy. FAS 123R will throw a lot of public companies in a frantic, however the smart ones are identifying the opportunity to master the process and take over the driving seat. The methodology and the tools developed by Dr. Johnathan Mun are proven, pragmatic, and offer a great deal of value and benefit to those early adopters. IBCOL Consulting AG is using Dr. Mun's algorithms and methodology because of their applicability, accuracy, and the fair-market values that we have obtained for our clients are significantly less than traditional Black-Scholes models."
—Dr. Markus Junginger, Managing Partner, IBCOL Consulting

From the software developers…

"After extensive review of the FASB exposure draft and consideration of a variety of option valuation methodologies, E*TRADE FINANCIAL has decided to implement a binomial lattice model in Equity Edge, our stock plan management and reporting software, in consultation with Dr. Johnathan Mun. We found Dr. Mun's work on employee stock option pricing very valuable."
—Naveen Agarwal, Director, Product Management , E*TRADE FINANCIAL Corporate Services



ROV MODELER, ROV OPTIMIZER, ROV VALUATOR, ROV SCHEDULER, ROV CHARTER, ROV BASEL II MODELER 1.1

- Runs advanced analyses on thousands to millions of data points at high speeds
- Compatible with ODBC-compliant databases including Oracle OFDM, CSV, Excel, flat text files and other DSN systems
- Monte Carlo Risk Simulation, Portfolio Optimization, Stochastic Forecasting, and Advanced Analytics (data fitting, data diagnostics, simulations, ARIMA, GARCH, and over 600+ advanced financial and analytical models)
- Results are compatible with ROV Dashboard for online secure management reporting, analytics are compatible with ROV Risk Simulator and ROV Real Options SLS software, and models are compatible with ROV Modeling Toolkit
- Fully customizable models and industry specific models (Basel II Credit and Market Risk)
- Clean your dataset with the Data Integrity checks and SQL commands before using the data in your analysis
- Schedule individual models or portfolios of models to run at specific times in a day or in a week

Real Options Valuation, Inc.

Real Options Valuation, Inc. 4101-F Dublin Blvd., Suite 425, Dublin, CA 94568 USA +1.925.271.4438 www.realoptionsvaluation.com

ROV RISK MODELER is a comprehensive software suite, developed by Real Options Valuation, Inc., and includes several modules. This software suite takes the modeling outside of Excel and into the database environment, allowing the end user the ability to directly link to databases and large data files, clean the data and run advanced analytics at very high speeds. This ROV Risk Modeler software suite comprises several modules, including:

- ROV Modeler is a customizable advanced analytical modeling software module for solving multiple types of models, including computing advanced models in various industries, advanced forecasting and simulation models, historical back-fitting, time-series forecasts (ARIMA, Autoeconometrics, Regression, stochastic processes, and others), volatility computation (GARCH), and many other applications. Also included in this module (as well as the Basel II Modeler and Risk Optimizer modules) is the ability to link and download from various databases and data sources (e.g., Oracle OFDM, SQL Server, Excel, CSV, text, and other ODBC compliant databases), screen and clean the data prior to use (applying SQL commands and data cleansing routines), compute new variables based on existing data, run Monte Carlo Risk Simulations, apply data and distributional fitting, and other advanced routines. This module is also customizable in that users can modify the functions list, descriptions, and what models or applications to show, allowing users to customize the tool to fit his or her needs, whereby you can decide which models are important to be shown or used while others can be locked and deleted (i.e., different departments, business units or industry groups may have their own customized modeler).
- ROV Basel II Modeler is an advanced analytical software module for solving multiple types of models, including computing advanced models in various industries (e.g., for banks, insurance and financial services companies, models such as probability of default, loss given default, exposure at default, Value at Risk, and other key metrics). It also functions like the ROV Modeler as described above.
- ROV Optimizer has the ability to quickly run project selection and investment or project portfolios using nonlinear optimization with simulation and stochastic optimization, all the while applying discrete integer, binary and continuous variables subject to multiple constraints, as well as an efficient frontier analysis. The optimization can be run on hundreds of decision variables and the results are computed quickly.
- ROV Risk Valuator has over 600 models and functions to value everything from simple options and exotic options to commodities, futures, and risk-return profiles of asset portfolios, and so forth. Please see the Appendix for a more detailed listing of the models that are available.
- ROV Charter runs different Modeler and Optimizer profiles and returns predefined XML files that can be used by ROV Dashboard to generate dynamic charts, tables, pivot tables and reports. ROV Dashboard is another software program developed by Real Options Valuation, Inc.
- ROV Scheduler runs different Modeler, Optimizer, Charter and Portfolio profiles and returns the results in flat text files that can be saved or easily uploaded into Excel or other databases.
- ROV Portfolio runs multiple Modeler and Optimizer profiles and multiple models immediately. This is similar to the Scheduler in that multiple models can be chosen to run at once from different profiles, but the difference is that the analyses are run immediately as opposed to being scheduled to run at a later time.

SYSTEM REQUIREMENTS

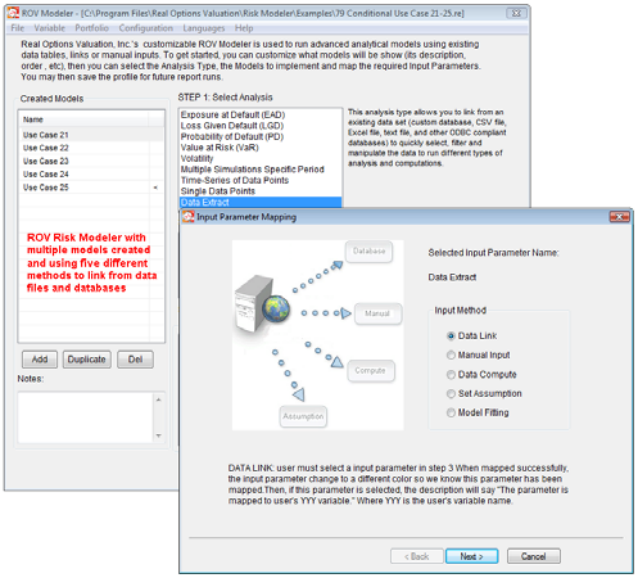
This software suite can be run in any Windows or MAC environment (MAC operating systems require Parallels or Virtual Machine to emulate a Windows environment), and is compatible with Microsoft Excel as well as other ODBC compliant databases and data files. The software suite requires 100MB of free disk space and recommended minimum 1GB of RAM for best performance. We recommend that the user has administrative rights (this is by default on most personal computers) but can also run on logins with limited user rights (simply install the software to a non-protected file/folder location in order to properly run the software).

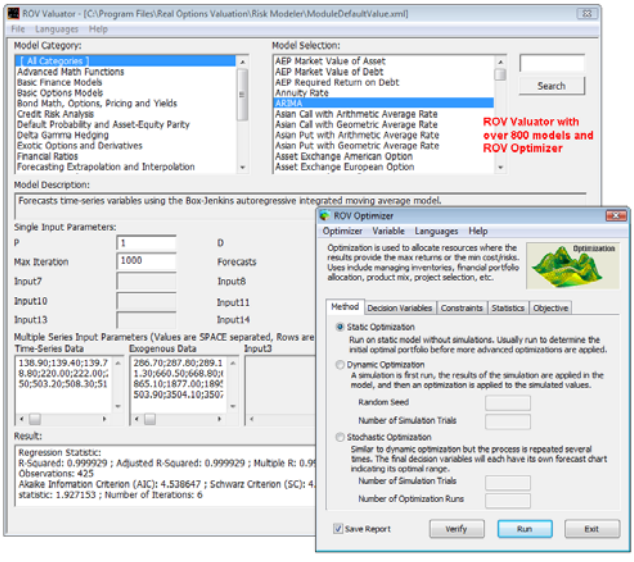
In addition, the ROV Modeler software suite has the ability to:

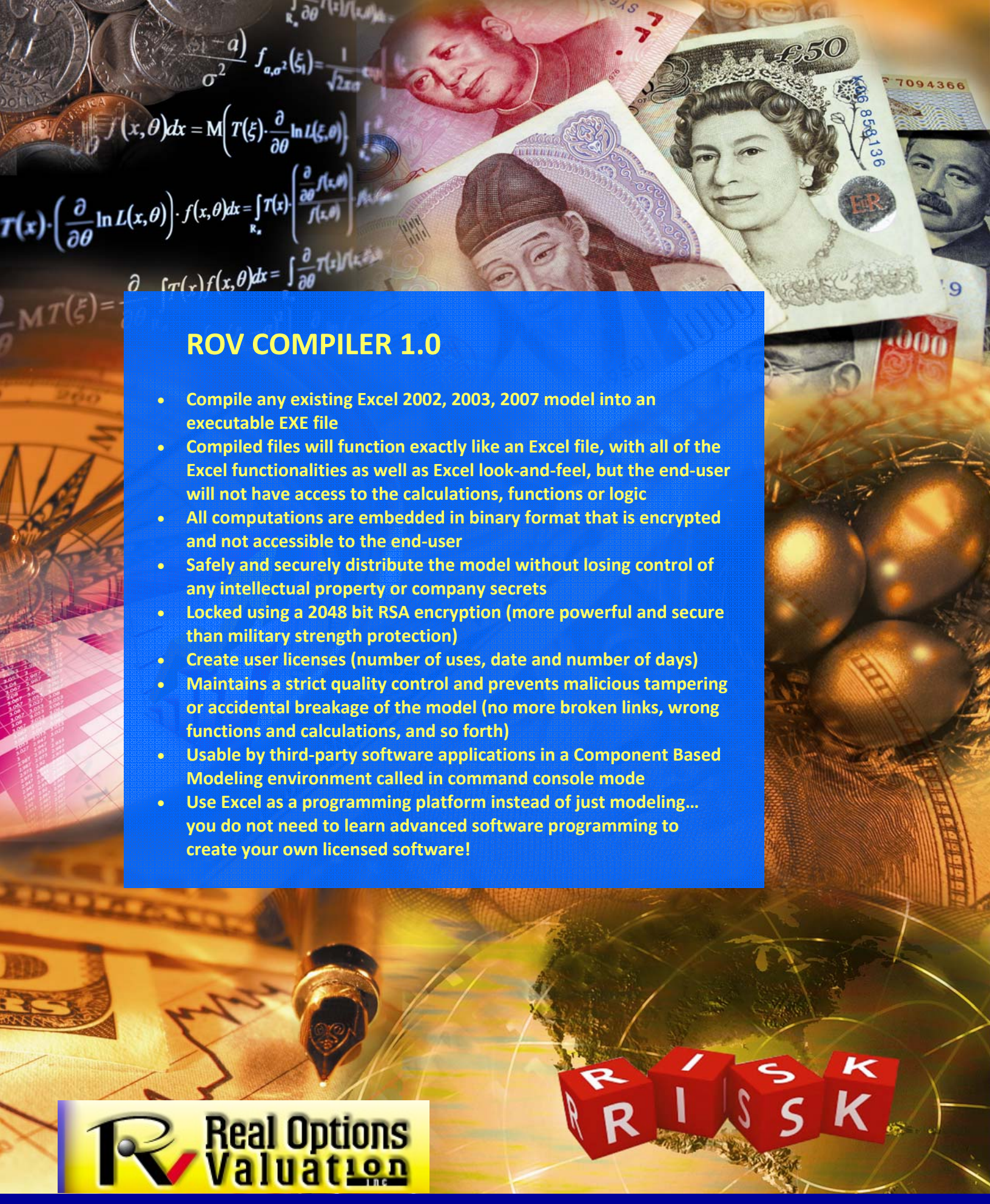
- Clean and filter your dataset through its Data Integrity and SQL Conditional screener and Data Compute capabilities, and check your data quality through its Data Diagnostics function
- Runs individual models or portfolios of models on a specific schedule, where the tool will automatically download predefined data links from databases and data files, run its analyses and return the results in specified XML or data file formats
- Provides 5 methods of variable mapping, to extract and download the required data from your database or data files for analysis, including Data Fitting, Data and Variable Compute, Distributional Assumption and Simulation, Manual Entry, and Data Link to data files or databases
- Runs on single core or multiple cores with multi-thread distribution and distributive processing
- Available in English, Chinese, Japanese, Spanish, Portuguese and more languages are forthcoming
- Individual modules can be used or purchased separately
- Applicable as a desktop software or server-based software

TRIAL VERSIONS

There are no trial versions of this software as the desktop and server implementation of this comprehensive software suite will need to include consulting and training.







ROV COMPILER 1.0

- Compile any existing Excel 2002, 2003, 2007 model into an executable EXE file
- Compiled files will function exactly like an Excel file, with all of the Excel functionalities as well as Excel look-and-feel, but the end-user will not have access to the calculations, functions or logic
- All computations are embedded in binary format that is encrypted and not accessible to the end-user
- Safely and securely distribute the model without losing control of any intellectual property or company secrets
- Locked using a 2048 bit RSA encryption (more powerful and secure than military strength protection)
- Create user licenses (number of uses, date and number of days)
- Maintains a strict quality control and prevents malicious tampering or accidental breakage of the model (no more broken links, wrong functions and calculations, and so forth)
- Usable by third-party software applications in a Component Based Modeling environment called in command console mode
- Use Excel as a programming platform instead of just modeling… you do not need to learn advanced software programming to create your own licensed software!

Real Options Valuation, Inc.

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ROV COMPILER is meant to be used to convert Microsoft Excel XP, 2003 and 2007 files to extract an existing model into pure mathematical relationships and code such that the same model can be used as usual but the intellectual property of the model is protected. You can now use Excel as a software development tool instead of only a modeling tool. That is, suppose you are an expert in a certain industry like banking, pharmaceutical, biotechnology, manufacturing, insurance, aeronautics, and so forth, and further suppose that you have developed Excel models and worksheets that are appropriate for use by others in the same field. You can now use ROV Compiler to create executable EXE files from your existing Excel models, lock up the mathematical, business and computational logic into binary code and create extremely secure hardware-locked license protection of your file and distribute it like a software program. The compiled file when run will have the exact look and feel of Excel, minus the ability of accessing critical calculation logic, plus the ability to be secured and licensed like a regular software program. There exists public domain software that will crack Excel passwords quickly and effortlessly, but these crack software will not work on compiled files. By running the extracted model, several items are accomplished, namely:

- Use Excel as a programming platform instead of just modeling… you do not need to learn advanced software programming to create your own licensed software!
- Any existing Excel 2002, 2003, 2007 files and beyond can be compiled–extracted from Excel XLS or XLSX files and turned into binary mathematical code and the file will become a self-executable EXE file–that when run, will open in Excel. The file will function exactly like an Excel file, with all of the Excel functionalities as well as Excel look-and-feel, but the end-user will not have access to the calculations, functions or logic. It will look and feel like Excel but the computations are all embedded in binary format that is encrypted and not accessible to the end-user.
- All of the business intelligence and relationships are maintained but will no longer be visible to the end-user, allowing the model creator to safely and securely distribute the model without losing control of any intellectual property or company secrets.
- The compiled model can be locked using a 2048 bit RSA encryption (more powerful and secure than military strength protection) and can only be accessible using the correct password and license (using computer hardware locking algorithms).
- The compiled model cannot be changed by the end user and this maintains a strict quality control and prevents malicious tampering or accidental breakage of the model (e.g., equations and functions with broken links, wrong functions and calculations, etc).
- The compiled file can also be used by third-party software applications in a Component Based Modeling environment. For instance, the end user might have his or her own software or database with predefined calculations. The compiled file is linked into and is a part of this existing proprietary system and can be called in command console mode. Your own proprietary software system simply obtains the inputs to link into the compiled file and the compiled model will perform the computations and return the required outputs.

SYSTEM REQUIREMENTS

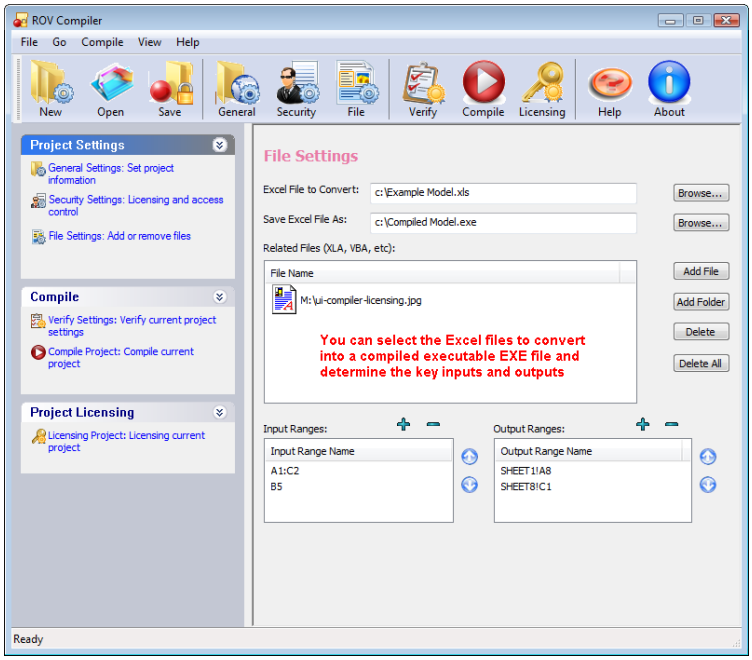
This software can be run in any Windows or MAC environment (MAC operating systems require Parallels or Virtual Machine to emulate a Windows environment), and is compatible with Microsoft Excel. The software suite requires 30MB of free disk space with a recommended minimum 1GB of RAM for best performance.

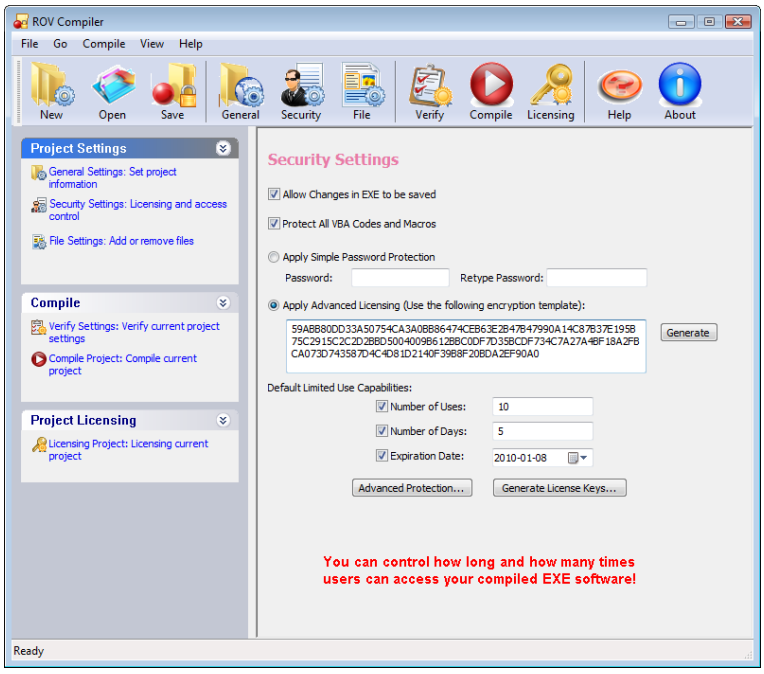
TRIAL VERSIONS

ROV Compiler 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 indispensible part of your modeling toolbox. However, please note that the trial version can only create 10-day licenses and will come with a trial version message (these will be gone in the fully licensed version).

Real Options Valuation

Please use the ROV Extractor and Evaluator software instead, also developed by Real Options Valuation, Inc., if you wish to extract the model into a file that runs completely outside of Excel (extracted into EXP files) where all of its calculations are hidden and protected. This ROV Extractor and Evaluator software complements the ROV Compiler software such that a large model that can take a long time to run in Excel can now be run at extremely fast speed in the lifted EXP model. Large scale Monte Carlo Risk Simulations with large number of trials can be performed at very high speeds. Large models with many irrelevant parts are identified and additionally, you can identify the main key inputs and outputs you wish to have modeled. For instance, in a model such as A+B+C=D, B+E=F, and if F is chosen as the key output, only B and E are relevant. This decreases the computational time for the model by identifying critical inputs, and the model can then be optimized to run even faster once the model thread is identified. The large Excel model can now be turned into a calculator-like environment, where all the end user has to do is enter in the inputs and obtain the outputs. Imagine it as akin to creating a very large Visual Basic function in Excel, but instead of a simple function with several lines of computations, this function is an entire Excel workbook with many interconnected worksheets.





ROV EXTRACTOR & ROV EVALUATOR 1.1

- ROV EXTRACTOR will compile an existing Excel 2007 model into an EXP file that can only be run in ROV EVALUATOR
- All business intelligence and modeling relationships are maintained but will no longer be visible to the end-user, allowing the model creator to safely and securely distribute the model without losing control of any intellectual property or company secrets
- A large model that can take a long time to run in Excel can now be run at extremely fast speeds in the extracted and lifted model (e.g., 1 million simulation trials on a regular sized model takes only a few seconds to run!)
- The extracted model can be locked using an RSA 1028 encryption (military strength protection) and can only be accessible using the correct password
- Large models with many irrelevant parts are identified with its key inputs and outputs, thereby decreasing computational time
- The large Excel model can now be turned into a calculator-like environment: enter in the inputs to obtain the outputs
- Create a new modeling paradigm! Extracted files are similar to creating a large Visual Basic function in Excel, but instead of a function with several lines of computations, this function is an entire Excel workbook with many interconnected worksheets
- Safely and securely distribute the model without losing control of any intellectual property or company secrets
- Maintain a strict quality control and prevent malicious tampering or accidental breakage of the model (no more broken links, wrong functions and calculations, and so forth)
- Usable by third-party software applications in a Component Based Modeling environment called in command console mode
- Use Excel as a programming platform instead of just modeling… you do not need to learn advanced software programming to create your own software!

Real Options Valuation, Inc.

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ROV EXTRACTOR & ROV EVALUATOR software is brought to you by Real Options Valuation, Inc. and is meant to work with Excel 2007 and later. This software is meant to be used inside of Microsoft Excel 2007 to extract an existing model into pure mathematical relationships and code such that the same model can be run outside of Excel. By running the extracted model, several items are accomplished, namely:

- All of the business intelligence and relationships are maintained but will no longer be visible to the end-user, allowing the model creator to safely and securely distribute the model without losing control of any intellectual property or company secrets.
- A large model that can take a long time to run in Excel can now be run at extremely fast speeds in the lifted model.
- Large-scale Monte Carlo Risk Simulations with a large number of trials can be performed at very high speeds.
- The extracted model can be locked using an RSA 1028 encryption (military strength protection) and can only be accessible using the correct password.
- Large models with many irrelevant parts are identified and additionally, you can identify the main key inputs and outputs you wish to have modeled. For instance, in a model such as A+B+C=D, B+E=F, and if F is chosen as the key output, only B and E are relevant. This decreases the computational time for the model by identifying critical inputs, and the model can then be optimized to run even faster once the model thread is identified.
- The large Excel model can now be turned into a calculator-like environment, where all the end user has to do is enter in the inputs and obtain the outputs. Imagine it as akin to creating a very large Visual Basic function in Excel, but instead of a simple function with several lines of computations, this function is an entire Excel workbook with many interconnected worksheets.
- The extracted model cannot be changed by the end user and this maintains a strict quality control and prevents malicious tampering or accidental breakage of the model (e.g., equations and functions with broken links, wrong functions and calculations, etc).
- The extracted file can also be used by third-party software applications in a Component Based Modeling environment. For instance, the end user might have his or her own software or database with predefined calculations. The extracted file is linked into and is a part of this existing proprietary system. This proprietary system simply obtains the inputs to link into the extracted file and the extracted model will perform the computations at high speed and return the required outputs.

SYSTEM REQUIREMENTS

The system requirements for the software include:

- Windows Vista
- Excel 2007 (older versions of Excel are not supported)
- 300MB free hard drive space
- 1GB RAM minimum
- Others: Microsoft .NET 3.5 Framework or later, VS Runtime, Microsoft Installer, and so forth

Please note that the .NET Framework 3.5 is included in the installation setup file, where the installer will first check your system and identify any missing prerequisites (e.g., .NET Framework 3.5, Microsoft Installer, VS Runtime, and other components) and automatically installs them before installing the ROV Extractor and Evaluator software.

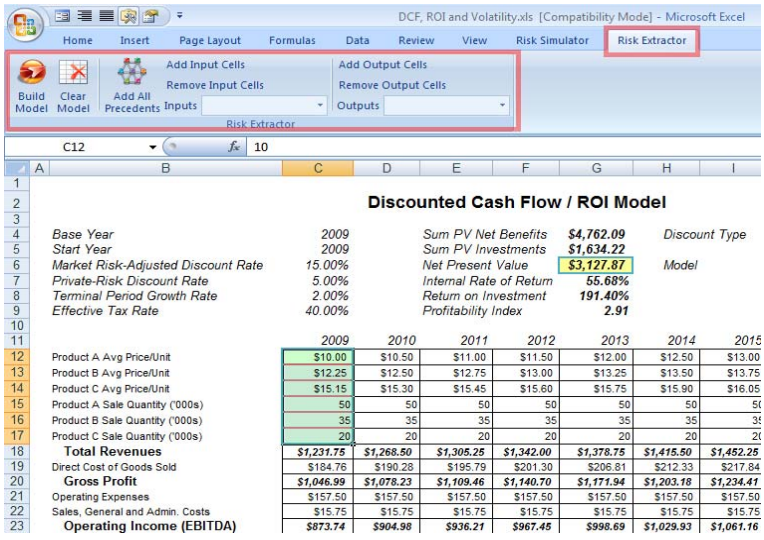
Real Options Valuation LLC

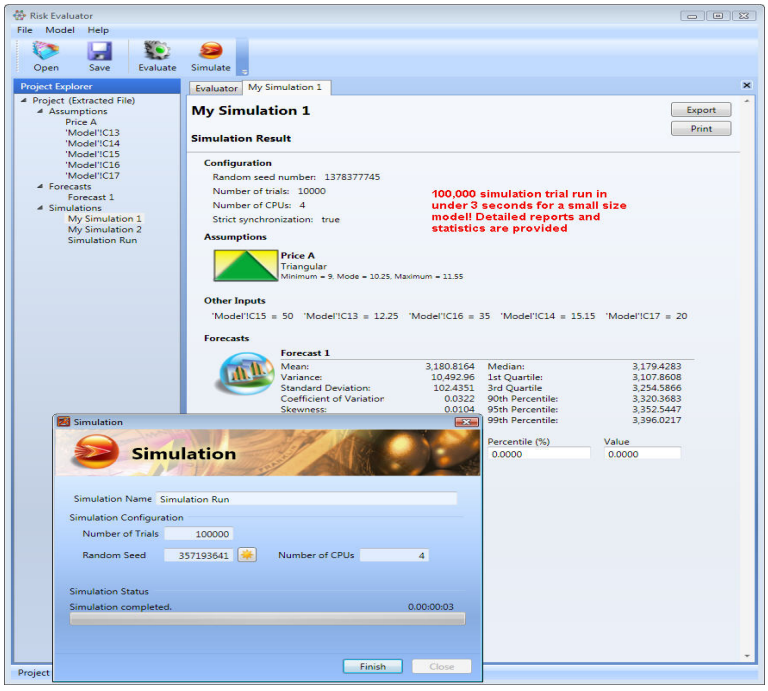
The ROV Extractor and ROV Evaluator software allows you to extract the model into a file that runs completely outside of Excel (extracted into EXP files) where all of its calculations are hidden and protected. This ROV Extractor and Evaluator software complements the ROV Compiler software such that a large model that can take a long time to run in Excel can now be run at extremely fast speeds in the lifted EXP model. Large scale Monte Carlo Risk Simulations with large number of trials can be performed at very high speed.

Please use the ROV Compiler software instead, if you wish to extract the model into a self-executable (EXE) file that runs inside Excel but all of its calculations are hidden, protected and can be licensed as its own software application. The ROV Compiler software complements this ROV Extractor and Evaluator software and is built by the same company.

TRIAL AND ACADEMIC VERSIONS

ROV Extractor and Evaluator 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 indispensible part of your modeling toolbox.





ROV BIZSTATS 1.1

- Simple business statistics add-in tool for Excel that computes commonly used day-to-day statistical applications
- Easy to use with detailed reports (complete with analytical results and detailed explanations of the results)
- Model Chooser to assist you in choosing the right types of analysis to run
- Analysis of Variance (ANOVA)
- Basic Statistics
- Hypothesis Testing (One and Two Variables)
- Monte Carlo Simulation (Basic)
- Nonparametric Tests
- Probabilities
- Stochastic Forecasting
- Time-Series Analysis
- Regression Analysis

Real Options Valuation, Inc.

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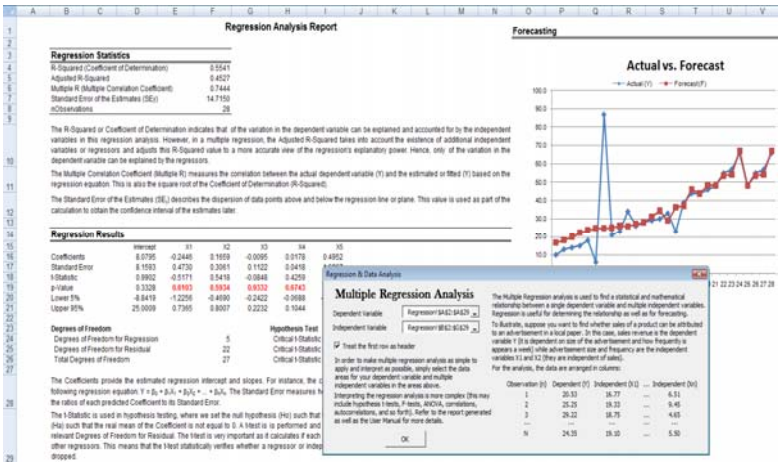
ROV BIZSTATS is an applied statistics toolkit that is focused on user-friendliness but yet is powerful enough to solve most day-to-day statistical problems. As an Excel add-in software, it will work with your existing data in your spreadsheets, with detailed reports complete with analytical results and detailed explanations of the results.

For more advanced statistical analyses, please use Risk Simulator for running Monte Carlo Risk Simulation, Stochastic Forecasting, Portfolio Optimization and other Advanced Analytics.

The ROV BizStats software is divided into 10 analytical modules:

- **Model Chooser** to assist you in choosing the right types of analysis to run based on the type of data and type of tests you are interested in doing by asking you a series of questions using basic day-to-day language
- **Analysis of Variance** (single factor ANOVA, randomized block multiple treatments, two-way ANOVA) to test if different sets of data are statistically similar or different from one another, after accounting for certain control variables
- **Basic Statistics** (descriptive statistics, correlation matrix, variance-covariance matrix) that will automatically analyze your data for you and returns the most commonly used statistical techniques
- **Hypothesis Testing** (One and Two Variables including t-test and Z-test for means and proportions with dependent and independent variances) to test if a data set is statistically similar or different from a hypothesized value
- **Monte Carlo Simulation** (runs 7 simple distributions for basic simulation requirements. Use Risk Simulator for more advanced simulation types)
- **Nonparametric Analysis** (chi-square goodness of fit and tests of independence and variances, Friedman's test, Kruskal-Wallis test, Lilliefors test, Runs test, Wilcoxon Signed-Rank test for one and two variables)
- **Probabilities** (creates exact probability tables from 18 distribution types)
- **Stochastic Forecasting** (jump-diffusion, mean-reversion and random walks)
- **Time-Series Analysis** (ARIMA, Auto ARIMA, and 8 time-series decomposition models)
- **Regression Analysis** (multivariate regression analysis and principal component analysis)



SYSTEM REQUIREMENTS

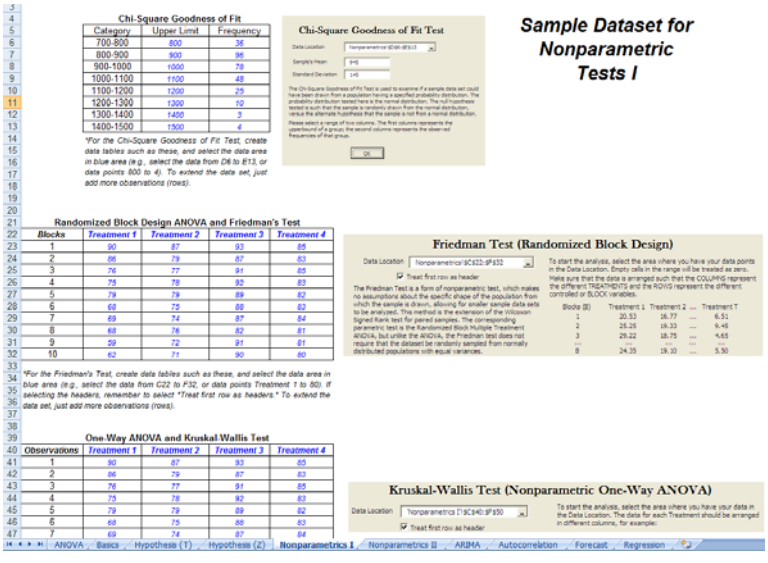
Windows XP or Vista and Excel XP, 2003 or 2007 with 30MB hard drive space and 512MB RAM minimum. Works on MAC running Parallels or Virtual Machine.

TRIAL VERSIONS

Trial versions of this software is available upon request and available at the download site. The trial version comes with a default 10 day license.

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 *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); *Modeling Risk: Applying Monte Carlo Simulation, Real Options Analysis, Forecasting and Optimization* (Wiley, 2006); *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).



Real Options Valuation

ROV DASHBOARD 1.0

- Create a professional looking set of reports, charts and tables that are highly intuitive, and protected by login and password encryption
- Create a truly paperless environment by logging in from anywhere in the world to view your reports that are constantly and automatically updated
- Comes in multiple languages including English, Chinese, Spanish, Japanese, Portuguese, Italian, French, German and Russian
- Fully compatible with ROV Risk Modeler
- Separation of duties and control with Administrators and Regular Users
- Charts and tables are highly interactive, including the ability to pivot data tables and change the chart types from a list of over 25 charts
- Create the settings for all the reports and source data one time and you can leave it alone as new data and results will automatically populate the reports

Real Options Valuation, Inc.

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ROV DASHBOARD is an enterprise software application that can be installed on a corporate server with multiple users as well as a standalone software application on a desktop computer.

The Enterprise Edition of ROV Dashboard is very simple to use, where as a user, you are only required to visit an internal web site and enter a login and password assigned to you by your network administrator. All of the technical requirements are handled by the server administrator. As an end user, you simply need the URL web address and your own login and password combination at the login page.

Here are some highlights to the ROV Dashboard system:

- Create a professional looking set of reports, charts and tables that are highly intuitive, and protected by login and password encryption
- Create a truly paperless environment by logging in from anywhere in the world to view your reports that are constantly and automatically updated each time you log on
- Comes in multiple languages including English, Chinese, Spanish, Japanese, Portuguese, Italian, French, German and Russian
- Fully compatible with ROV Risk Modeler where the output XML files created from ROV Modeler can be read and updated in the ROV Dashboard
- Create the settings for all the reports and source data and you can leave it alone as new data and results will automatically populate the reports every time the user logs on
- Charts and tables are highly interactive, including the ability to pivot data tables and change the chart types from a list of over 25 charts
- Together with ROV Modeler, ROV Dashboard provides a seamless end-to-end solution set for your company's intensive data crunching and analysis needs
- We will provide initial proof of concept consulting and training on analyzing your company's data and analytical needs, implement them inside Excel with the help of ROV Risk Simulator and ROV Modeling Toolkit, and convert these into ROV Modeler for actual software implementation (we will send our IT personnel to configure the server settings), and the senior executives in the firm will only access the management dashboard reports in ROV Dashboard
- Very simple and highly intuitive 4 step process in creating reports:
    - Set Up Users
    - Set Up Widgets and Data Source
    - Set Up Reports
    - Assign Reports to Specific Users
- Two types of users can be set up: Administrators and Regular Users
- Administrators have the rights to:
    - Create new users, change passwords and login privileges
    - Create new reports and assign these reports to different report groups and different users
    - Create new widget items such as charts and tables, and their source data location
- Regular users have the rights to:
    - View dashboard reports that they are only authorized to view and receive
    - Update certain charts and tables in the report

Real Options Valuation, Inc.

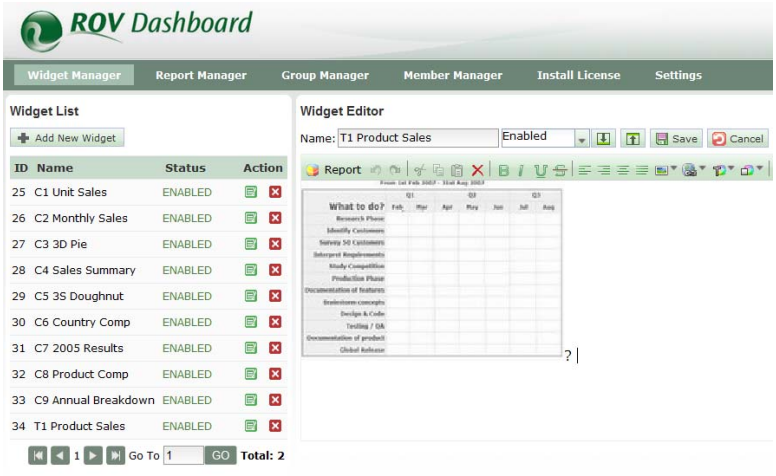
TRIAL VERSIONS

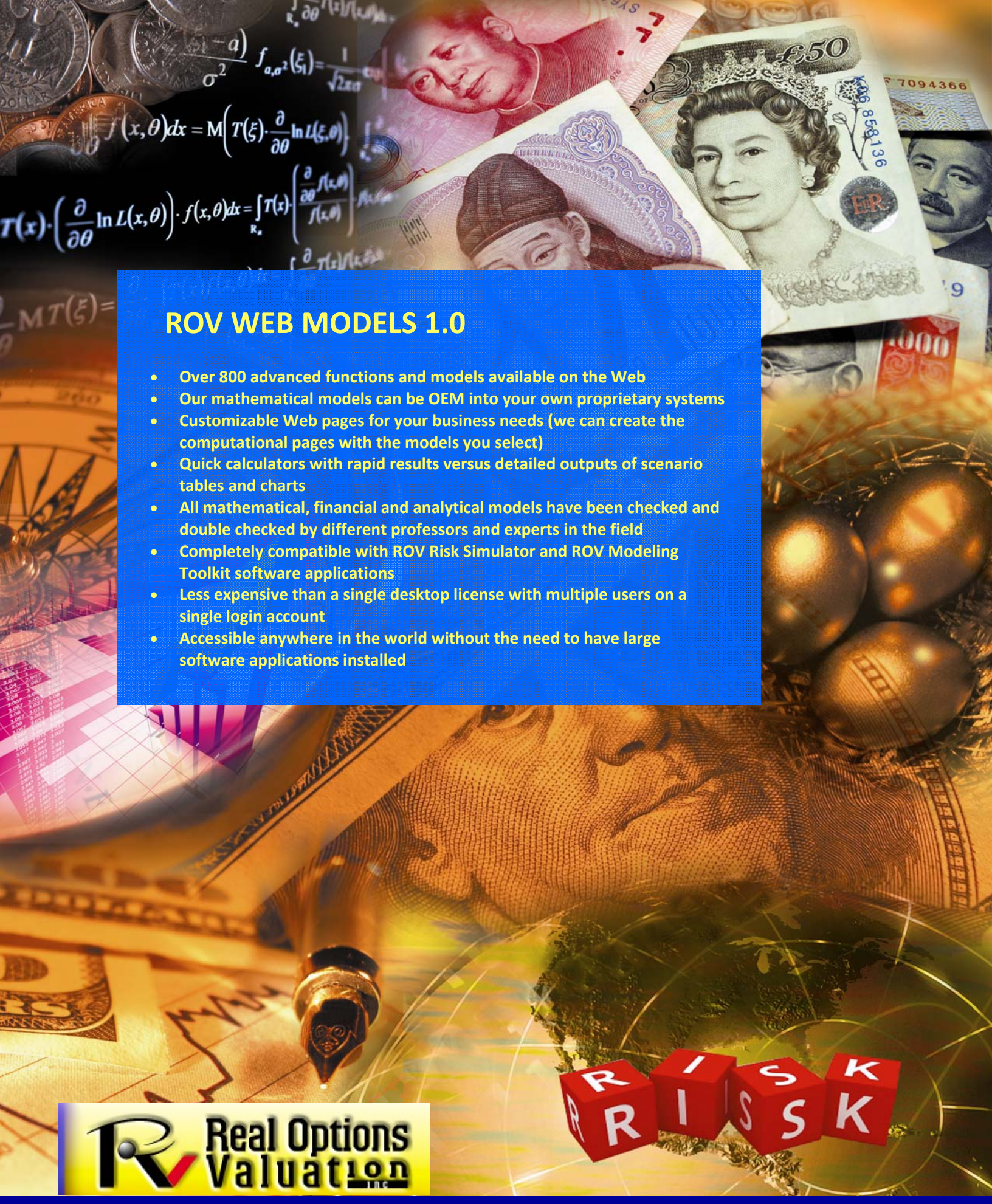
There are no trial versions for ROV Dashboard as this tool requires consulting and training before implementation, and the typical implementation is on a server-based environment, together with the ROV Modeler suite of tools (the ROV Modeler is used to download and link to databases and data files to perform advanced analytics on thousands and millions of data points and returns the results in XML files that can be read, updated and viewed in ROV Dashboard).

SYSTEM REQUIREMENTS

ROV Dashboard is a Java Web application based on Hibernate, Spring, and Struts technologies. For the desktop edition, all you need is Windows (XP and Vista, 32 and 64 bits), Linux, Unix, or Mac and a free Internet web browser such as Internet Explorer or Firefox.

For the enterprise server edition, it runs on any Java application server and supports all popular relational database management systems (RDBMS). It can be installed on Windows (XP and Vista, 32 and 64 bits), Linux, Unix, Mac, and supports X86, X64, AMD64, and IA64 architectures. It also supports all popular RDBMS such as MSSQL Server, Oracle, DB2, Sybase, MySQL, et cetera. The front-end user interface for ROV Dashboard is a Web 2.0 application, using Ajax, Flash, and XML technologies. Finally, for server-based environments, we usually perform the initial consulting and implementation for your firm. The consulting includes applying ROV Modeler analytics to your firm's data and the subsequent use of the ROV Modeler generated results in ROV Dashboard.





ROV WEB MODELS 1.0

- Over 800 advanced functions and models available on the Web
- Our mathematical models can be OEM into your own proprietary systems
- Customizable Web pages for your business needs (we can create the computational pages with the models you select)
- Quick calculators with rapid results versus detailed outputs of scenario tables and charts
- All mathematical, financial and analytical models have been checked and double checked by different professors and experts in the field
- Completely compatible with ROV Risk Simulator and ROV Modeling Toolkit software applications
- Less expensive than a single desktop license with multiple users on a single login account
- Accessible anywhere in the world without the need to have large software applications installed

Real Options Valuation Inc

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ROV WEB MODELS is a set of models and functions that are accessible on the Internet using Internet Explorer or Firefox browsers.

Here are some highlights of the ROV Web Models:

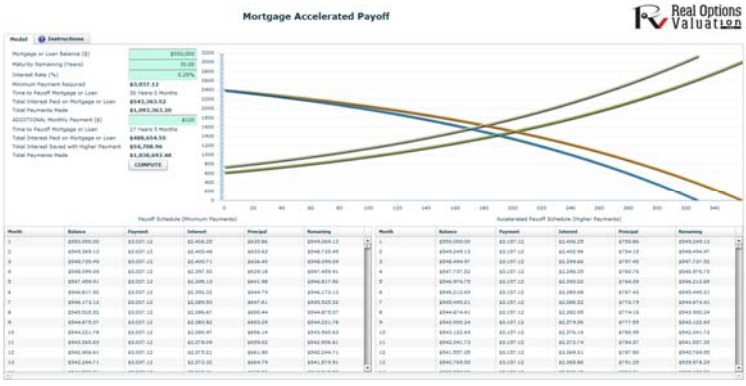
- Over 800 advanced functions and models available on the Web
- Multiple basic financial planning models with interactive tables and charts (life insurance, accelerated mortgage amortization, retirement planning, college savings, personal investment plans, and many more) on the Web
- We can customize and create any new models that suit your needs and these models can either be uploaded on our site or on your own systems
- Our mathematical models can be implemented or OEM into your own proprietary systems
- Customizable Web pages for your business needs (we can create the computational pages with the models you select)
- Quick calculators with rapid results versus detailed outputs of scenario tables and charts
- All mathematical, financial and analytical models have been checked and double checked by different professors and experts in the field
- Completely compatible with ROV Risk Simulator and ROV Modeling Toolkit software applications
- Less expensive than a single desktop license with multiple users on a single login account
- Accessible anywhere in the world without the need to have large software applications installed
- The detailed list of our 800+ advanced models are available for download on our website, and these models are distributed into the following groups:
  - Advanced Math Functions
  - Basic Finance Models
  - Basic Options Models
  - Bond Math, Options, Pricing and Yields
  - Credit Risk Analysis
  - Default Probability and Asset-Equity Parity
  - Delta Gamma Hedging
  - Exotic Options and Derivatives
  - Financial Ratios
  - Forecasting Extrapolation and Interpolation
  - Inventory Analysis
  - Probability Distribution CDF, ICDF, PDF
  - Probability Distribution Theoretical Moments
  - Put-Call Parity and Option Sensitivity
  - Queuing Models
  - Six Sigma Models
  - Value at Risk, Volatility, Portfolio Risk and Returns
  - Real Options Analysis

SYSTEM REQUIREMENTS

All you need is Internet access and a suitable browser such as Internet Explorer or Firefox. We will handle all the requirements on our servers.

TRIAL VERSIONS

There are no trial versions for this Web model.



Real Options Valuation, Inc.

Software-based Hands-on
Seminars and Courses

Certified in Risk Management (CRM)
Senior Credit Risk Management (SCRM) Certification

Risk Analysis Course
- Analytical Tools
- Basic Real Options (SLS software)
- Forecasting (Risk Simulator)
- Monte Carlo Simulation (Risk Simulator)
- Optimization (Risk Simulator)

Real Options for Analysts
- The basics of real options
- Understanding the basics of the SLS software
- Framing basic options

Real Options for Executives
- The basics of real options
- Making strategic decisions using real options
- Framing strategic options
- Interpreting options results

Valuing Employee Stock Options
- Applying binomial lattices in the ESO Toolkit to value employee stock options under the 2004 revised FAS 123

Customized Seminars and Courses
- Courses customized to your firm's specific needs

Sample companies that have been through our training seminars:

3M, Accenture, AIG, Allstate Insurance, Airbus, Alexion, Aquiva Trading, AT&T, Boeing, Chevron Texaco, Duke Energy, Eli Lily, GE, GE Capital, Glaxo SmithKline, Intel, Johnson & Johnson, Lloyds Bank, Motorola, Phillips, Pioneer, Roche Molecular Diagnostics, Seagate, Schlumberger, Shell, Sprint, Sunoco, Syngenta, Timken, Total Elf Fina, Washington Gas, and many others!

Real Options Valuation

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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. We offer several hands-on training courses and seminars in the areas of risk analysis and real options analysis, taught by world-leading experts on the topics. Our classes are generally kept to a small size to cultivate a better learning atmosphere and to provide the opportunity for more one-on-one attention by the instructors. Courses are typically conducted in regional locations around the world (check our website for the latest schedule) in state-of-the-art computer-equipped seminar rooms, where each participant will have his or her own computer terminal.

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. This 2-day hands-on computer-based course using Risk Simulator covers the following topics:

- Monte Carlo simulation (simulation, nonparametric bootstrap simulation, correlated copula simulation, truncation, distributional fitting, applied statistics to interpret simulation results, hypothesis testing, data extraction and analysis, multidimensional simulation, pitfalls, profiling in simulation, and performing due diligence)
- Forecasting (time-series forecasting, multivariate regression, nonlinear extrapolation, stochastic process forecasting, Box-Jenkins ARIMA, basic econometrics, GARCH modeling, logistic curves, forecasting without data, Delphi method, seasonality modeling, and much more!)
- Optimization (linear optimization on continuous and discrete integer decision optimization, portfolio optimization, efficient frontier analysis and decision analysis techniques)
- Modeling Analytics (scenario analysis, sensitivity analysis, tornado and spider analysis, simulation, overlay charts, and others)
- Basic Real Options (sample business cases and examples of real options applications, understanding the basics of real options)

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.

This is a 2-day hands-on computer-based course using Real Options Super Lattice Solver software (SLS) and covers the following topics:

- Introduction to real options: what, where, who, when, how, and why
- Sample applied business cases in real options analysis
- Overview of different options valuation techniques: closed-form models, partial differential equations, and binomial lattices
- Applying the risk-neutral probability technique, European, American and Bermudan options, as well as abandonment, expansion, contraction, chooser options, and 4 different estimating volatility methods
- Overview of the different SLS modules and computing volatility
- Solving options with changing inputs and customized exotic options, complex multiphased sequential compound options, mean-reverting options, jump-diffusion options, and dual-asset rainbow options using trinomial, quadranomial, and pentanomial lattices
- Framing real options—structuring the problem

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. This 1-day seminar is geared toward executives, managers, and decision makers and covers the following topics:

- High-level overview of risk analysis and real options analysis
- Sample real-life business cases and applications in multinational firms
- Problem framing of strategic options
- Asking the right questions and due diligence in strategic real options
- Understanding how to interpret the real options results

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). On completion of a 4-day seminar and all associated in-class projects and problems, and a certification exam at the end of the session, you qualify for the CRM certification. In 4-6 weeks, you will received your CRM certificate indicating your new credential. You will then be allowed to use the CRM designation on your name cards or on other business documents. The following facts pertain to this certification.

The International Institute of Professional Education and Research (IIPER) is a global institute with partners and offices around the world including the United States, Switzerland, Hong Kong, Mexico, Portugal, Singapore, Nigeria, Malaysia, and others. IIPER's CRM certification is accredited by the National Certification Commission and IIPER is a member of the prestigious AACSB (Association for the Advancement of Collegiate Schools of Business). AACSB is one of the largest U.S. accreditation agencies recognized by the U.S. Department of Education, and has over 500 business schools around the world as its members. Further, IIPER's seminars are approved by the Project Management Institute (PMI) and participants can also obtain 30 professional development units (PDU) upon completion of the course. IIPER's International Standards Board comprises professors from various universities including Lehigh University (Pennsylvania), University of Applied Sciences (Switzerland), Naval Postgraduate School (California), University of Missouri (Kansas City), and others. IIPER also has strategic alliances and collaborations with various research institutions globally.

CUSTOMIZED ON-SITE SEMINARS

Any of the seminars can be customized for onsite delivery for your firm. The advantages include having content specific to your needs, business case applications specific to your industry and immediate requirements, and the ability to openly discuss any proprietary data, models, or strategies (covered under mutual nondisclosure agreements).

- Learn from real experts in the field with the best credentials and hands-on expertise and experience, not from a group of unqualified trainers.
- Get it straight from the source! The main seminar instructor is the creator of the Risk Simulator and Real Option Super Lattice Solver (SLS) software, the author of 7 books on the topics of risk modeling, real options, and valuation. He is also a professor in finance and economics, a consultant to many multinationals, and is known globally for his expertise in risk analysis and real options.
- Get free books, training models and examples, videos, course slides, and many other getting started materials.

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 *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); *Modeling Risk: Applying Monte Carlo Simulation, Real Options Analysis, Forecasting and Optimization* (Wiley, 2006); *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).

CERTIFIED IN RISK MANAGEMENT

Certified in Risk Management crm

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Attend one of our 4 Day intensive Integrated Risk Analysis seminars, complete the requisite in-class work, and obtain the fully-accredited Certified in Risk Management (CRM) designation offered by the International Institute of Professional Education and Research

"Never seen a trainer so capable!" *Hussein Alghamdi, Savola Group, Saudi Arabia*
"Excellent instructor and workshop with practical examples." *Y.L.Lee, Industrial Engineer, Seagate Technology*
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Robert Fourt, Partner, Gerald Eve Consulting (UK)

Real Options Valuation Inc

Real Options Valuation, Inc. 4101-F Dublin Blvd., Suite 425, Dublin, CA 94568 USA +1.925.271.4438 www.realoptionsvaluation.com

Real Options Valuation, Inc. is the global preferred provider for the International Institute of Professional Education and Research® (IIPER) and we have been granted the rights to teach CRM certification courses and upon completion of our 4-day seminar and the successful completion of a live test administered on the last day, participants will be granted the CRM designation! Real Options Valuation, Inc. is one of the three organizations in the world with rights to grant this CRM designation.

So, how do our seminars compare to others? Surprisingly, our 4-day training seminars are **lower in price** than other so-called simulation courses, and at the completion of the training, you will receive your **CRM designation**, something that other firms *cannot* provide. In addition, the training will be conducted by the exclusive CRM-designated trainer, Dr. Johnathan Mun, founder and CEO of Real Options Valuation, Inc.; a professor; a world-renown expert on risk analysis; author of 7 books on the topics of risk, valuation, and strategy; as well as the developer of our Risk Simulator and Real Options SLS software. Compare that to being trained by a fresh college graduate with less than two years of experience at other firms or a general MBA with insufficient grounding in the theory/application of risk analysis. You will not only learn the practical applications of risk analysis, but also the theoretical underpinnings of these applications.

ADVANTAGES

The key advantages of attending one of our seminars are as follows:

- Obtain the **Certified Risk Analysts (CRM)** designation.
- Learn from real experts in the field with the best credentials and hands-on expertise and experience, not from a group of unqualified trainers.
- Get it straight from the source! The main seminar instructor is the creator of the Risk Simulator and Real Option Super Lattice Solver (SLS) software, the author of 8 books on the topics of risk modeling, real options, and valuation. He is also a professor in finance and economics, a consultant to many multinationals, and is known globally for his expertise in risk analysis and real options.
- Get free books, training models and examples, videos, course slides, and many other getting started materials.

The International Institute of Professional Education and Research (IIPER) is a global institute with partners and offices around the world including the United States, Switzerland, Hong Kong, Mexico, Portugal, Singapore, Nigeria, Malaysia, and others. IIPER's CRM certification is accredited by the National Certification Commission and IIPER is a member of the prestigious AACSB (Association for the Advancement of Collegiate Schools of Business). AACSB is one of the largest U.S. accreditation agencies recognized by the U.S. Department of Education, and has over 500 business schools around the world as its members. Further, IIPER's seminars are approved by the Project Management Institute (PMI) and participants can also obtain 30 professional development units (PDU) upon completion of the course. IIPER's International Standards Board comprises professors from various universities including Lehigh University (Pennsylvania), University of Applied Sciences (Switzerland), Naval Postgraduate School (California), University of Missouri (Kansas City), and others. IIPER also has strategic alliances and collaborations with various research institutions globally.

CRM SEMINAR TOPICS

MODULE 1: Introduction to Risk Analysis

Chapter 1: Introduction to the Training and what to expect
Chapter 2: How Are Business Decisions Made?
Chapter 3: What is Risk and Why Should Risk be Considered?
Chapter 4: Overview of Risk Analysis Software Applications

MODULE 2: Monte Carlo Simulation with Risk Simulator

Chapter 1: Overview of Risk Simulator Software
Chapter 2: Profiling, Assumptions, Forecasts and Running Simulations
Chapter 3: Interpreting the Forecast Statistics
Chapter 4: Simulation Run Preferences and Seed Values
Chapter 5: Running Reports, Saving and Extracting Simulation Data

MODULE 3: Advanced Simulation Techniques

Chapter 1: Correlating and Truncating Distributions
Chapter 2: Alternate Parameters
Chapter 3: Multidimensional Simulations
Chapter 4: Distributional Fitting
Chapter 5: Due Diligence and Pitfalls in Simulation

MODULE 4: Simulation and Analytical Tools

Chapter 1: Static Tornado and Spider Charts
Chapter 2: Dynamic Sensitivity Analysis and Scenario Analysis
Chapter 3: Hypothesis Test on Different Distributions
Chapter 4: Nonparametric Bootstrap Simulation

MODULE 5: Optimization with Risk Simulator

Chapter 1: Introduction to Optimization
Chapter 2: Continuous Optimization
Chapter 3: Integer Optimization

MODULE 6: Forecasting

Chapter 1: Overview of Forecasting Techniques and Data Types
Chapter 2: Forecasting Without Data
Chapter 3: Time-Series Analysis Forecasting
Chapter 4: Nonlinear Extrapolation
Chapter 5: Multivariate Linear and Nonlinear Regression Analysis
Chapter 6: Stochastic Processes
Chapter 7: Advanced Forecasting: Box-Jenkins ARIMA and Auto ARIMA, GARCH, J-Curve, S-Curves, Markov Chains, Data Diagnostics, Statistical Properties, Basic Econometrics

MODULE 7: Real Options Analysis: Theory and Background

Chapter 1: Real Options: What, Where, Who, When, How, and Why?
Chapter 2: Sample Applied Business Cases
Chapter 3: Overview of Different Options Valuation Techniques
Chapter 4: Risk-Neutral Probability Technique
Chapter 5: Solving a Basic European and American Call Option
Chapter 6: Using Excel to Solve a Basic European and American Call Option
Chapter 7: Abandonment, Expansion, Contraction, and Chooser Options

MODULE 8: Real Options Analysis: Application with SLS Software

Chapter 1: Overview of the Different SLS Modules and Volatility Estimates
Chapter 2: Volatility Estimates
Chapter 3: Options with Changing Inputs and Customized Exotic Options
Chapter 4: MSLS: Multiple Sequential Compound Options
Chapter 5: MNLS: Solving Mean-Reverting, Jump-Diffusion, and Dual-Asset Rainbow Options using Trinomial, Quadranomial, and Pentanomial Lattices
Chapter 6: Framing Real Options—Structuring the Problem
Chapter 7: The Next Steps…

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SENIOR CREDIT RISK MANAGEMENT (SCRM) CERTIFICATION PROGRAM

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On Prof. Morton Glantz...
"Superb explanations of complex concepts." *-Tim P., African Development Bank*
"An extraordinary mix of theory and practice." *-Javier C., Banco Bac San Jose, Costa Rica*
"Simply cutting edge stuff." *-Aamir L., Allied Bank Limited*
"Excellent skills, great educator, and a great personality." *-Alberto N., Interamerican Development Bank*

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SENIOR CREDIT RISK MANAGEMENT (SCRM)
BASEL II COMPLIANCE CERTIFICATION PROGRAM

BACKGROUND

The arrival of the Basel II Accord and the need for more thoroughness and visibility in managing risk are driving financial institutions to search for new systems technology that reduce exposure to unexpected, unwarranted credit, portfolio, operational and other risks. Institutions require superior technology resources and risk-management tools to precisely measure all types of risks. Improved technology and sophistication is precisely what the Board of Directors expect to see at their banks.

Therefore, bankers and regulators alike need to be confident that the methodologies used to measure the full spectrum of banking risks are conceptually sound, unequivocally current, empirically validated, and produce capital requirements that are acceptable to stakeholders, management, the board, and regulators.

COURSE OBJECTIVES

- Develop the ability to drill down counterparty risk exposure with respect to industry concentrations
- Determine Basel II impact on enterprise technology
- Gain knowledge of compliance issues relating to operational risk
- Hedge against market risk utilizing sophisticated tools like option pricing (Real Options SLS software) and risk-simulation techniques (Risk Simulator software)
- Master migration risk and learn how to use risk matrices to value loans and optimize a loan portfolio
- Develop stochastic RAROC pricing and VaR models
- Master advanced cash flow analysis by untangling Enron's reports
- Reduce operating risk by developing Basel II compliant, interactive, and industry-specific risk-rating systems for active portfolio management
- Reduce operating risk by setting up an efficient workout area and recovery strategies that promote bank capital by reducing portfolio risk
- Gain knowledge of Monte Carlo simulation, stochastic forecasting, stochastic optimization, and strategic real options risk-mitigation techniques
- Replicate the credit rating of collateralized debt obligations and portfolio credit linked notes

WHO SHOULD ATTEND

Credit Managers, Accountants, Corporate and Financial Consultants, Credit Analysts, Treasury Managers, Risk Analysts, Financial Analysts, Corporate Bankers, Investment Bankers, Corporate Lending Officers, Research and Ratings Personnel, Portfolio Managers, Bank Regulators, Management and Strategy, Venture Capital Executives Consultants, and others.

COURSE INSTRUCTOR—PROF. MORTON GLANTZ

Professor Glantz spent his career in diversified banking and corporate environments on a domestic and global scale. He consults with foreign governments, international banks and software leaders on valuation issues, financial software development and risk management. His main interest is helping banks in developing economies, notably in Africa. Professor Glantz was instrumental in the reorganization and development of the credit analysis module of JP Morgan Chase (heritage bank) Management Training Program in Finance, acknowledged at the time as one of the foremost training programs in the banking industry. Prof. Glantz is on the finance faculty at the Fordham Graduate School of Business. He has appeared in Harvard University International Directory of Business and Management Scholars and Research and earned Fordham University Deans Award for Faculty Excellence.

Professor Glantz is published extensively in financial journals and has authored *Credit Derivatives* (co-authors Erik Banks and Paul Siegel, 2006), *Optimal Trading Strategies*, AMACOM 2003 (co-author: Robert Kissell), *Managing Bank Risk*, Elsevier Science 2003 (RISKBOOK.COM Award: 10 Best Finance Books of 2003). *Scientific Financial Management*, AMACOM 2000 and *Loan Risk Management* (1994), McGraw Hill (1995). A new book, *The Banker's Handbook on Basel II*, Elsevier Science is under contract for publication in 2008.

COURSE INSTRUCTOR—PROF. DR. JOHNATHAN MUN

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ABOUT THE SCRM CERTIFICATION

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The SCRM hands-on intensive training seminars allows the participant to understand and apply the New Basel II Accord's quantitative requirements. The SCRM seminar is for **senior bank executives** who require additional training and certification for Basel II. Although the seminar is computer and hands-on case study with lectures, we do not go as in-depth in modeling as the regular CRM seminar for analysts, making this seminar perfect for the bank executive. The key advantages of attending one of our seminars are:

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- Learn from real experts in the field with the best credentials and hands-on expertise and experience.
- Get it straight from the source! The seminar instructors include the creator of the Risk Simulator and Real Option Super Lattice Solver (SLS) software, the authors of over 12 books on the topics of banking risk, credit risk, risk modeling, real options, and valuation. They are also professors in finance and economics, consultants to many multinationals, and are known globally for their expertise in banking risk analysis and real options.
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COURSE CURRICULUM

PART ONE: CREDIT RISK (PROF. GLANTZ)

Day 1: Module 1 - Introduction to Credit Risk
Accurate monitoring and calculation of credit risk must be integrated into a bank's overall risk exposure. This analysis must include identification and measurement of weaknesses in a bank's portfolio for concentrations of risk by segment, geography, counterparty and the appropriate capital to meet the risk exposure. The time-tested PRISM credit model is analyzed along with the Basel Committee's principles for managing credit risk.

Day 1: Module 2 - Distance to Default Infrastructure
Default probability, loss given default, migration risk, default probability and distance to default, Moody's-KMV distance to default formula, transforming distance-to-default calculation to expected default frequencies, and how to reduce risk on single loans and a portfolio of loans.

Day 1: Module 3 - Advanced Cash Flow Modeling and Analysis
Developing a banker's cash flow model, identifying accounting shenanigans – dealing with and curing a banker's "headache," the control sheet and reconciliations.

Case Study: An analysis of Enron's Cash Flow statements to learn what bankers should have discovered but didn't.

Day 1: Module 4 - Loan Pricing and RAROC
Incorporating computerized risk-rating systems into the pricing matrix to determine hurdle ROE, ROA and RAROC (the loan area requirements), how the facility's "expected loss frequency" affects the pricing of the facility VaR and risk-adjusted performance measurement, loan servicing and activity costs, and the "fee-in-lieu-of-balances" calculation.

PART TWO: ADVANCED RISK ANALYTICS SIMULATION, STOCHASTIC FORECASTING, PORTFOLIO OPTIMIZATION (PROF. DR. MUN)

This section deals with hands-on models and short case applications.

Day 2: Module 1 - Monte Carlo Risk-Based Simulations
Simulations are extremely valuable forecasting tools, giving decision makers and lenders the ability to answer questions dealing with budget constraints, profit planning, and asset management decisions. Delegates are introduced to Monte Carlo simulation, working with an entire range of results and confidence levels feasible for any given situation. The principle behind Monte Carlo simulation comprises real world situations with elements of uncertainty too complex to be solved analytically. We will compare deterministic and stochastic forecasting methods, forecasts, and confidence levels techniques for stress testing and determining the expected default frequency.

Day 2: Module 2 - Analytical Techniques
Static and dynamic sensitivities, bootstrap simulation, data fitting, and other decision analysis techniques are shown and modeled. We will be computing and simulating Value at Risk models and portfolios of loans. In addition, the effects of linear and nonlinear cross-correlations will be discussed and modeled in a portfolio to determine the effects of diversification.

Day 2: Module 3 - Stochastic Optimization
Identify a borrower's optimal maximum/minimum values subject to constraints and how to handle nonlinear relationships using stochastic optimization to analyze financing of corporate restructurings. Portfolio optimization and efficient allocation of resources and projects, as well as efficient frontiers are discussed.

Day 2: Module 4 - Stochastic Forecasting
Various forecasting techniques are shown, including time-series decomposition, Delphi expert method, Box-Jenkins ARIMA, multivariate regressions and stochastic processes. The SCRM certification program requires that delegates understand the fundamentals of these techniques and the pros and cons, and not become experts in these areas. The key to this module is the due diligence involved when looking at a forecasting method and when evaluating its results.

PART THREE: REAL OPTIONS ANALYSIS (PROF. DR. MUN)

Day 3: Module 1 - Introduction to Real Options Analysis
Introduction to a very powerful risk-reduction and risk-management technique called real options analysis that are starting to be taught at major universities around the world including Harvard and MIT. This module explains the what, where, who, when, how, and why of real options analysis, as well as provide real-life case studies and examples (e.g., Airbus, Boeing, 3M, Motorola, Seagate, U.S. Military, etc).

Day 3: Module 2 - Real Options Analysis
An analytical comparison of financial options versus real options is performed, including the various methods used to solve financial and real options (closed-form solutions, binomial and multinomial lattices, simulation, and so forth). Small cases in real options analysis are solved, including options to wait and defer, option to abandon, option to expand, option to contract, barrier options, sequential compound options, and so forth.

Day 3: Module 3 - Real Options Analysis
Using Option Pricing Theory to extract credit information embedded in equity markets. Using option pricing models to determine dynamically expected default frequencies and migration matrices affecting loan values and appropriate facility yields. Volatility and debt/equity values. Determining the riskless hedge, finding probabilities that options finish in-the-money, quantifying the trade-off between risk and pricing, and determining migration risk through option pricing techniques.

Day 3: Module 4 - Real Options Analysis in Credit Proposals
Discounted cash flow analysis estimates a project's base value, accounting for the impact of negative risk. Add real options to account for the impact of positive uncertainty in estimating a borrower's project value. Introduction to real options, issues to consider, implementing real options analysis, industry applications, running simulations and optimization project with different real options. Also, case studies on real options analysis in the industry will be discussed.

PART FOUR: LOAN PORTFOLIO AND OPERATIONAL RISK (PROF. GLANTZ)

Day 4: Module 1 - Loan Portfolio Operational Risk
To be in compliance with Basel II, a banking institution must deliver appropriate reporting of operational risk exposures and loss data particularly at the portfolio level to its board of directors and senior management. These reports must summarize operational risk exposure, loss experience, relevant business environment and internal control assessments, and identify and assess the portfolio risk inherent in all material loan products, activities, processes, and systems.

Case Study: Savannah West (Spreadsheet projections and simulation analysis of a construction project).
Case Study: RI Furniture Corp. (Optimizing revenue given constraints and uncertainty, valuations, and running simulations in the background).

Day 4: Module 2 - Operational Risk and Credit Rating Models
In constructing Risk Rating Systems for Specialized Lending and Active Portfolio Management, delegates learn to structure an industry and/or sector-designed credit rating grid and, in groups, undertake computer modeling exercises with real data. Risk rating systems must be industry precise to establish adequate reserves against loss, assign capital under Basel II, determine expected loss and syndicate deals. Delegates learn to construct highly structured risk rating systems including project finance and real estate/construction. Particular attention will be directed to risk rating system practices in major globally active banks, such as JP Morgan portfolio risk rating models, design and applications of project finance risk rating, construction and adoption from BIS hard copy tools and methodology of credit grading by banks, including financial and non-financial factors. Basel proposed three-year cumulative default rate benchmarks monitoring and trigger levels; S&P assessment of 20-year average of three-year cumulative default rate determination of reserve for project write-off; borrower and transaction risks incorporating auditing functions into risk rating evaluating; setting up obligor financial measure weights auditing component of credit risk rating systems; transition matrices loan loss reserve based on loss given default.

Team Presentations
Case Study: Petroleum Development Corporation
Delegates risk rate this firm engaged in oil and natural gas extraction. Using Put and Call pricing structure on this loan proposal. Delegates go through a defense of their case presentation (see previous module) with a new level of defense: explaining and defending their risk rating of this credit.

Day 4: Module 3 - Operational Risk and Loan Management Information Systems: The Data Analysis Challenge
A Basel II compliant institution must have a risk analysis framework that uses a combination of internal and external operational loss event data, business environment and internal control factor assessments, and scenario analysis. Thus, compliance with Basel II requires analysis of enormous amounts of data, particularly in the case of banks with large networks of domestic and foreign branches. Many financial institutions are finding that existing solutions cannot provide the level of detail nor the analytical and reporting functionality required to manage risk globally as required under Basel II. Here, delegates learn the fundamentals of this important portfolio management tool and discuss how it can be applied within their own institution. We will examine data mining and warehouse systems. Portfolio exposure management, GES basic data family responsibility (coordination) unit, how to set up the reporting function within a GES, GES and reports to the board of directors, information flow: data technology: data mining, data warehousing, on-line analytical processing (OLAP) and data marts.

Day 4: Module 4 - Operational Risk and Loan Workout
The goals of workout are twofold: to explain why the credit is not performing as agreed and to develop an analytical foundation for thinking about solutions to the problem. Poorly organized workout areas will significantly increase operational risk and reduce portfolio quality. Nature and goals of loan workouts, classified loan write up, the eleven big questions of workouts, required documentation, compliance with agreements, follow-up procedures and documentation, debt recoveries and valuation, and value engineering in turnarounds.

Team Presentations - Case Study: Jen Krist Inc.

Day 4: Module 5 - Analysis of Today's Most Popular Portfolio Models
- CreditMetrics
- McKinsey CreditPortfolioView
- Moody's KMV Portfolio Manager:
- Moody's-KMV other models: RiskAnalyst, LossCalc, CreditEdge
- Standard and Poor's Models: CDO Evaluator, Credit Risk Tracker, CreditModel, Default Filter, Model Evaluation, CreditPro, CreditRisk+

Day 4: Module 6 - Credit Derivatives and Collateralized Debt Obligations
Credit derivatives are financial instruments allowing for a secluded trading in credit risk, thus offering new ways for both hedging and investing. They can be used for risk reduction and portfolio diversification, but also for the creation of synthetic assets, arbitrage of market inefficiencies and investment in spread expectations. CDOs are a way to repackage a portfolio of existing financial assets (usually bonds or loans) into new tranches, which are built so as to have different riskiness. International Swaps and Derivatives Association's (ISDA) standard documentation for credit derivatives, the use of credit default swaps and of structured instruments credit linked notes (how they work and calculating payoffs), total return swaps (how they work and calculating payoffs), counterparty risk regulators' concerns, Cash or Synthetic CDOs.

Day 5: Module 1 - Default Correlation
Deriving default correlations and computing default correlations as well as targeting the portfolio Efficient Frontier.

Case Study: What are Portfolio Correlations?
Food Products Co., a beef producer (the only exposure in a hypothetical bank's portfolio). The bank can diversify its portfolio with a loan to Poultry Farms Corp., a poultry producer. Both loans except for industry differences and macroeconomic sensitivities are identical: loan amount, risk ratings, asset size, key ratios, quality, magnitude, trend of cash flows. Will the new loan reduce unexpected loss to the portfolio and reduce capital allocations?

Day 5: Module 2 - Deal Analysis: Rating Agency Analysis of Portfolio Credit Linked Note
This is one of the most important cases in the course. Reference portfolio is $2.0 billion. Delegates replicate rating, structure, pricing, and valuation of this complex portfolio hedge by combining disciplines mastered in the course: option pricing, simulation, interactive risk rating, etc. The deal: a replenishable portfolio of senior secured or unsecured debt obligations of at least 70 companies that have been originated by the First City Bank Group. As of Dec.12, 2003, each company in the portfolio has a Rating Agency rating or an equivalent credit rating by First City Bank LTD, of 'BBB-' or higher. Noteholders are not exposed to the first $137.0 million of portfolio losses (the threshold amount) under the credit swap agreement with First City Bank LTD. This equates to 6.85% of the $2.0 billion reference portfolio.

This case builds on sequential credit and restructuring decisions as events trigger this apparel manufacturer's rapid deterioration. Delegates work in groups and have to decide how far the bank group should go in supplying credit.

PART FIVE: PORTFOLIOS AND MANAGEMENT COMPLIANCE/AUDIT (PROF. GLANTZ)

Day 5: Module 3 - Loan Policy Committee
The following topics will be covered:
- Credit policy committee
- Setting up statements of a loan policy
- The credit review function
- CAMELS - A structure for analyzing banks, used by the IMF
- Regulatory bank analysis
- Regulatory and Internal Audits
- Examination of audit requirements, manuals and audit checklists

Day 5: Module 4 - Bank Board of Directors Responsibility
A review of required board of directors reports that help insure compliance, statement of balance condition, statement of income, statements of changes in capital and reserve accounts, including variance investment reports showing securities by classifications, book and market value, and yield loan reports, listing significant past due loans, trends in delinquencies, rate reductions, non-income producing loans, and large new loans granted since the last report. Audit and examination reports all new executive officer borrowing, listing type and amount of borrowing by the bank, presentation of bank insurance coverage, correspondence addressed to the board of directors from the Federal Reserve, and any other source analysis of the bank's liquidity position and projection of the capital needs listing of new litigation, and a status report on existing litigation and potential exposure.

Day 5: Module 5 - Review for the SCRM examination requirements
A comprehensive review will be provided during this time for the SCRM examination. This review is created to prepare the delegate to successfully complete the SCRM certification examination.

PART SIX: SCRM CERTIFICATION EXAMINATION (PROF. DR. MUN)

The SCRM or Senior-CRM certification examination is a 50-question multiple choice examination. The required passing score is 60% on the exam, and completion of 5 days of intensive hands-on training seminars. Delegates must have a minimum of 5 years of experience and hold a minimum of a Bachelor's degree or its equivalent, or 10 years of experience with a lower degree equivalence. The examination will be conducted in the classroom and the examination is an open-book, and open-computer exam. However, team work is strictly forbidden. All delegates taking the examination will first have to complete an application form for IIPER. All fees are included in this seminar.

CLIENT REFERENCES

Sample companies that have been through our training seminars or obtained our software and consulting services: 3M, Accenture, AIG, Allstate Insurance, Airbus, Alexion, Aquiva Trading, AT&T, Boeing, Chevron Texaco, Duke Energy, Eli Lily, GE, GE Capital, Glaxo SmithKline, Goodyear, Halliburton, Intel, Johnson & Johnson, Lloyds Bank, Motorola, Phillips, Pioneer, Roche Molecular Diagnostics, Seagate, Schlumberger, Shell, Sprint, Sunoco, Syngenta, Timken, Total Elf Fina, Washington Gas, and many others!

ON TRAINING AND SEMINARS

GE *(world's largest corporation):*

"Dr. Johnathan Mun is a brilliant and energetic instructor able to take the most difficult subjects and make them understandable and practical. Certainly the best instructor I have had in a long time." ***-Curtis Ching, Director of Business Development and Finance, GE, GE Money (Asia)***

3M *(world's most creative firm):*

"Johnathan Mun is able to take even the most difficult and technically challenging concepts and make them simple to understand and applicable to today's challenging and changing business environments. It is definitely one of the best seminars I have ever attended and I would rate Dr. Mun among the top lecturers in the field." -***Robert Finocchiaro, Ph.D., Director of Corporate R&D Services, The 3M Company (USA)***

U.S. Department of Defense *(world's largest employer):*

"Great presentation! A must have! Very good session with the best cost/option/risk discussion I've seen. This should be required for every new crop of Navy Admirals. This session was awesome. Great presenter – kept us interested. He described and presented a set of tools for a senior leader to use to make better decisions. Dr. Mun was very animated and enthusiastic. Real-world examples added significantly to understanding. Demand the audience to think. Very good real world examples were included. Simply outstanding!" ***-A compilation of quotes from Navy Commanders and Captains at the U.S. Naval Postgraduate School (USA)***

The Timken Company *(most charitable corporation):*

"Dr. Johnathan Mun has been able to put together both the learning approach and teaching materials that make the changing of our cognitive schema of how we manage risk in a digestible form. Since the future of business is focused on vigilant decision making, the approach that Dr. Mun utilizes is by far one of the most effective mechanisms for supporting corporate sustainability." ***Kenneth English, Director of Emerging Technologies, The Timken Company (USA)***

Gerald Eve *(a real estate consulting firm based in the U.K.):*

"Dr. Mun has the ability to take the rocket out of the science and bring complicated matters very much down to earth in a matter of fact and memorable way. Put simply you come away from his sessions not only having learnt a great deal, but starting to use it in practice immediately."
-Robert Fourt, Partner, Gerald Eve Consulting (UK)

"Dr. Johnathan Mun is one of the most gifted teachers of quantitative risk analysis in the history of global finance and business. All of his books combine science, art, intuition, creativity, and above all, they are acutely perceptive, always practical, and provide startling clarity, on the methods and pathways of proper business decision making, when faced with uncertainty. His software tools contain a vast treasure trove of over 600 models, unlike anything ever created in the field. Absolutely groundbreaking…The practical application of the risk models in his books, software, and lectures will keep the rest of us busy, for years to come!" ***-Brian Watt, Chief Risk Officer & CFO, GECC (USA)***

"Use of real-world examples to illustrate concepts was great. Dr. Mun has a thorough knowledge of the subject and was able to impart the knowledge to the participants."
-Tim Mull, Navy Captain, U.S. Department of Defense (USA)

"The depth and knowledge of the instructor and the ability to follow on the computer with a hands-on approach to learning from actual practice was incredible." ***-Debra Gordon, Credit Analyst, National Bank of Dominica (Caribbean)***

"The technical materials was made easy to understand by the excellent explanations and examples."
-Mark Rhoades, Professor, Naval University (USA)

"An excellent delivery of a complex subject Matter. Dr. Mun kept the entire class engaged at all times."
-Lou Owayni, Senior Project Manager, Adaptec (USA)

"Very relevant to my work with a great breadth of subject matter with a great presentation style."
-Chris Law, Director of Project Services, Genentech (USA)

"Excellent knowledge gained." -***Vitorio Stana, Director of Quality Assurance, Avcorp Industries (Canada)***

"Clear explanation of subject matter, enthusiasm and approachability of Dr. Mun." -***Andrew Putney, Maxiom Consulting Group (USA)***

"Johnathan's knowledge and enthusiasm for the subject matter and the ability to provide realistic examples that are applicable made an awesome seminar"
-Kristi Novinger, Senior IT Project Manager, APL Limited (USA)

"Dr. Mun's knowledge was fantastic and his enthusiasm was high and contagious. I really enjoyed the subject matter."
-Brian Suter, Project Manager and Analyst, Wells Fargo (USA)

ON BOOKS, METHODOLOGY, AND ANALYTICS

AIRBUS *(the world's largest aircraft manufacturer located in France):*
"Johnathan Mun has previously published a number of very popular books dealing with different aspects of risk analysis, associated techniques and tools. This last publication puts all the pieces together. The book is really unavoidable for any professional who wants to address risk evaluation following a logical, concrete and conclusive approach." ***-Jean Louis Vaysse, Deputy Vice President, Airbus (France)***

SEAGATE *(one of the world's largest hard drive makers):*
"A must read for product portfolio managers... it captures the risk exposure of strategic investments, and provides management with estimates of potential outcomes and options for risk mitigation." ***-Rafael E. Gutierrez, Executive Director of Strategic Marketing , Seagate Technology (USA)***

GEMPLUS *(makers of flash memory and smart cards in France):*
"Mun demystifies real options analysis and delivers a powerful, pragmatic guide for decision makers and practitioners alike. Finally, there is a book that equips professionals to easily recognize, value, and seize real options in the world around them." ***-Jim Schreckengast, Sr. Vice President, R&D Strategy, Gemplus International SA (France)***

MONITOR GROUP *(a premier consulting firm):*
"…this book is a must have and must read… Dr. Mun's new book is a refreshing, cutting-edge look at a powerful new decision making process… it isn't often you can truthfully say a book breaks new ground, but [this book] has certainly done that."
-Glenn Kautt, CEO, Monitor Group, Inc. (USA)

WHARTON *(one of the world's best business schools):*
"Real Options Analysis is the clearest book on real options that we have read to date. It does an excellent job of demystifying a difficult and complex subject. It provides a solid basis for conceiving, assessing, and evaluating real options investments, which will make it useful to practitioners and students alike."
-Ian MacMillan, Ph.D., Fred Sullivan Professor of Entrepreneurship, Wharton School, University of Pennsylvania (USA)

KOZO *(a premier developer in Japan):*
"Many books on real options can be intimidating. Mun offers a pragmatic, reliable and entertaining guide. Complex concepts and formulas are brilliantly interspersed with well chosen examples and step-by-step walk through from a variety of industries."
-Shota Hattori, President and CEO, Kozo Keikaku , Inc. (Japan)

GARTNER GROUP *(a premier consulting and publication outfit):*
"Strategy development has fallen on hard times being judged not relevant for a rapidly changing world. With this book, Dr. Mun attacks this poor excuse head-on by presenting a clearly organized, tool supported, methodology that logically progresses from exploring uncertainty that bounds risk to the creation of options for constructing realistic business strategies"
-Robert Mack, Vice President, Gartner Group (USA)

"…finally, a real options analysis book that is technically sophisticated enough to be useful, and practically written so that it can actually be used. It is destined to become the handbook of real options."
-Tracy Gomes, President, Intellectual Property Economics, (USA)

"...written from the viewpoint of an educator and a practitioner, his book offers a readable reference full of insightful decision making tools to satisfy both the novice and the experienced veteran."
-Richard Kish, Ph.D., Finance Chair/Professor, Lehigh University (USA)

"Mun has converted his tacit financial knowledge into a digestible user-friendly book. He effectively leads the reader on a solid path starting from *discounted cash flow,* progressing through *Monte Carlo analysis* and evolving to *real options* to get even closer to the target of achieving confident corporate decisions. His ability to clearly explain the relationships of popular competing analysis methods will make this a must have reference book for today's decision makers."
-Kenneth English, Director of R&D, The Timken Company (USA)

"The book leads the field in real options analytics and is a must-read for anyone interested in performing such analyses. Dr. Mun has made a formidable subject crystal clear and exponentially easy for senior management to understand. *Monte Carlo simulation* and *real options* software alone is worth the book price many times over." ***-Morton Glantz, Renowned educator in finance, author of several books, financial advisor to government and private entities (USA)***

"Mun provides a very practical step-by-step guide to applying simulations and real option analysis—invaluable to those of us who are no longer satisfied with conventional valuation approaches alone."
-Fred Kohli, Head of Portfolio Management, Syngenta Ltd. (Switzerland)

"Most of us come to real options from the perspective of our own areas of expertise. Mun's great skill with this book is in making real options analysis understandable, relevant and therefore immediately applicable to the field within which you are working."
-Robert Fourt, Partner, Gerald Eve (UK)

"Johnathan Mun's book is a sparkling jewel in my finance library. Mun demonstrates a deep understanding of the underlying mathematical theory in his ability to reduce complex concepts to lucid explanations and examples. For this reason, he's my favorite writer in this field. Experienced professionals will appreciate Mun's competence in boiling down complex math to a clear presentation of the essential solutions to financial risk, corporate finance, and forecasting. " ***-Janet Tavakoli, CEO, Tavakoli Structured Finance***

"Every year the market of managerial books is flooded again and again. This book is different. It puts a valuable tool into the hands of corporate managers, who are willing to stand up against uncertainties and risks and are determined to deliver value to shareholder and society even in rough times. It is a book for the new generation of managers, for whom Corporate America is waiting."
-Dr. Markus Junginger, Managing Partner, IBCOL Consulting (Switzerland)

"Dr. Mun breaks through the hyperbole and presents a clear step-by-step approach revealing to readers how quantitative methods and tools can truly make a difference. In short, he teaches you what's relevant and a must know. I highly recommend this book, especially if you want to effectively incorporate the latest technologies into your decision making process for your real world business. "
- Dr. Paul W. Finnegan, MD, MBA, Vice President, Commercial Operations and Development, Alexion Pharmaceuticals, Inc.

"Mun has the uncanny ability to clarify the complex, distilling risk analysis concepts into a truly readable and practical guide for decision-makers. This book blazes a trail that connects abstract yet powerful theories with real-world applications and examples, leaving the reader enlightened and empowered." ***-Stephen Hoye, CEO, Hoye Consulting***

"This book is a pleasure to read both for subject matter experts as well as for novices. It holds a high risk of addicting the readers. Dr. Mun leads the readers through step by step complex mathematical concepts with unmatched ease and clarity. Well chosen examples and pointers to pitfalls complement the splendidly written chapters. This book will be a bestseller in Risk Management and is a *must read* for all professionals."
-Dr. Hans Weber, Syngenta AG (Switzerland)

"Dr. Mun's new book provides the best and most comprehensive pragmatic guide to valuing strategic decisions and options--both in the corporate setting as well as in evaluating strategic military decisions. This book is an instant classic and must be read by anyone who needs to perform real options, decision, and risk analysis. The second edition is more versatile by expanding the scope and coverage of practical hands-on real options cases while continuing the high standard of excellence in the first edition. Simply put, this is the most practical and theoretically sound book I have ever read on the subject of real options." ***-Tom Housel, Ph.D., Professor of Information Sciences (Naval Postgraduate School, Department of Defense, Monterey (USA)***

"…the clarity and comprehensive coverage makes it one of the best guides for all practitioners… coupled with state-of-the-art financial tools CD-ROM."
-Michael Sim, Partner, Moores Rowland International (Hong Kong)

"Once again, Dr. Johnathan Mun has attained his usual standard: excellence in making not-so-simple but very useful quantitative analytical techniques accessible to the interested reader who doesn't necessarily have an engineering or scientific training. This book presents a seriously comprehensive guide to everyday users of spreadsheet models, particularly those interested in Risk Analysis and Management, on how to move beyond simple statistical analysis. It is a "must have" to academicians searching for user-friendly bibliography, and to practitioners willing to get a first-hand experience on cutting-edge, high-productivity analytical tools." ***-Dr. Roberto J. Santillan-Salgado, Director of the M.S., EGADE-ITESM, Monterrey Campus (Mexico)***

"Dr. Mun's latest book is a logical extension of the theory and application presented in *Real Options Analysis*. More specifically, The *Real Options Analysis Course* presents numerous real options examples and provides the reader with step-by-step problem solving techniques. After having read the book, readers will better understand the underlying theory and the opportunities for applying real option theory in corporate decision-making."
-Chris D. Treharne, M.B.A., A.S.A., M.C.B.A., President Gibraltar Business Appraisals, Inc. (USA)

"This text provides an excellent follow up to Dr. Mun's first book, *Real Options Analysis*. The cases in the *Real Options Analysis Course* provide numerous examples of how the use of real options and the Real Options Toolkit Software can assist in the valuation of strategic and managerial flexibility in a variety of arenas, with many practical and useful examples." ***-Charles T. Hardy, Ph.D., M.B.A., Chief Financial Officer & Director of Business Development, Panorama Research, Inc. (USA)***

"Mun certainly has earned the reputation of being an expert on the subject… consultants, analysts, decision makers and engineers will be all over this book and its software."
-Phyllis Koessler, Managing Director, Koessler and Associates (Switzerland)

FOUNDER BIOGRAPHY

DR. JOHNATHAN MUN, Ph.D., MS, MBA, BS, CRM, CRA, FRM, CFC, MIFC

Dr. Johnathan C. Mun is the founder, Chairman and CEO of Real Options Valuation, Inc. (ROV), a consulting, training, and software development firm specializing in strategic real options, financial valuation, Monte Carlo simulation, stochastic forecasting, optimization, and risk analysis located in northern Silicon Valley, California. ROV currently has partners in California, New York, Chicago, Mexico, Chile, Switzerland, Australia, Japan, and a local subsidiary in Shanghai, China. He is also the Chairman of the International Institute of Professional Education and Research (IIPER), an accredited global organization providing the Certified in Risk Management (CRM) designation among others, staffed by professors from named universities from around the world. He is also the creator of all the software products at ROV, including Risk Simulator, Modeling Toolkit, Real Options Super Lattice Solver, Employee Stock Options Valuation Toolkit, ROV Compiler, ROV Extractor and Evaluator, ROV Modeler, ROV Basel II Modeler, ROV Dashboard, ROV Optimizer, ROV Valuator, Web Calculators, and others, as well as the risk analysis Training DVD and he holds public seminars on risk analysis and Certified in Risk Management (CRM) programs. He has authored ten books including The Banker's Handbook on Credit and Market Risk: Implementing Basel II (Elsevier 2008), and Advanced Analytical Models: 800 Applications from Basel II to Wall Street and Beyond (Wiley 2008), Modeling Risk: Applying Monte Carlo Simulation, Real Options, Optimization, and Forecasting, (Wiley 2006), Real Options Analysis: Tools and Techniques, First and Second Editions (Wiley 2003 and 2005), Real Options Analysis Course: Business Cases (Wiley 2003), Applied Risk Analysis: Moving Beyond Uncertainty (Wiley 2003), Valuing Employee Stock Options (Wiley 2004), and others. His books and software are being used at top universities around the world (including the Bern Institute in Germany, Chung-Ang University in South Korea, Georgetown University, ITESM in Mexico, Massachusetts Institute of Technology, Naval Postgraduate School, New York University, Stockholm University in Sweden, University of the Andes in Chile, University of Chile, University of Pennsylvania Wharton School, University of York in the United Kingdom, and Edinburgh University in Scotland, among others).

Dr. Mun is also currently a finance and economics professor and has taught courses in financial management, investments, real options, economics, and statistics at the undergraduate and the graduate M.B.A. levels. He is teaching and has taught at universities all over the world, from the U.S. Naval Postgraduate School (Monterey, California) and University of Applied Sciences (Switzerland and Germany) as full professor, to Golden Gate University (California) and St. Mary's College (California), and has chaired many graduate thesis and doctoral research dissertation committees. He also teaches risk analysis, real options analysis, and risk analysis for managers' public courses where participants can obtain the Certified in Risk Management (CRM) designation upon completion of the week-long program. He also holds the position of the EU President of the American Academy of Financial Management and sits on the Global Board of Standards at the AAFM. He was formerly the Vice President of Analytics at Decisioneering, Inc. where he headed up the development of options and financial analytics software products, analytical consulting, training, and technical support, and where he was the creator of the Real Options Analysis Toolkit software, the older predecessor of the Real Options Super Lattice software. Prior to joining Decisioneering, he was a Consulting Manager and Financial Economist in the Valuation Services and Global Financial Services practice of KPMG Consulting and a Manager with the Economic Consulting Services practice at KPMG LLP. He has extensive experience in econometric modeling, financial analysis, real options, economic analysis, and statistics. During his tenure at Real Options Valuation, Inc., Decisioneering, and at KPMG Consulting, he had taught and consulted on a variety of real options, risk analysis, financial forecasting, project management, and financial valuation issues for over 200 multinational firms (former and current clients include 3M, Airbus, Boeing, BP, Chevron Texaco, Financial Accounting Standards Board, Fujitsu, GE, Microsoft, Motorola, Pfizer, State of California, Timken, U.S. Department of Defense, U.S. Navy, Veritas, and many others). His experience prior to joining KPMG included being Department Head of financial planning and analysis at Viking Inc. of FedEx, performing financial forecasting, economic analysis, and market research. Prior to that, he did financial planning and freelance financial consulting work.

Dr. Mun received his Ph.D. in Finance and Economics from Lehigh University, where his research and academic interests were in the areas of Investment Finance, Econometric Modeling, Financial Options, Corporate Finance, and Microeconomic Theory. He also has an M.B.A. in business administration, an M.S. in management science, and a B.S. in Biology and Physics. He is Certified in Financial Risk Management (FRM), Certified in Financial Consulting (CFC), and is Certified in Risk Management (CRM). He is a member of the American Mensa, Phi Beta Kappa Honor Society, and Golden Key Honor Society as well as several other professional organizations, including the Eastern and Southern Finance Associations, American Economic Association, and Global Association of Risk Professionals. Finally, he has written many academic articles published in the Journal of the Advances in Quantitative Accounting and Finance, the Global Finance Journal, the International Financial Review, the Journal of Financial Analysis, the Journal of Applied Financial Economics, the Journal of International Financial Markets, Institutions and Money, the Financial Engineering News, and the Journal of the Society of Petroleum Engineers.

SAMPLE CLIENT LIST

- 3M
- ABS Consulting
- Accenture
- Airbus
- AIG
- Air Products and Chemicals
- Alexion
- Alliant Energy
- Allstate Insurance Company
- Aquila
- Arena Pharmaceutical
- AT&T
- Bayer
- Becton Dickinson
- Bergey Inc.
- Black & Veatch
- BOC Gases
- Boeing
- Booz Allen & Hamilton
- BP
- Bristol Myers Squibb
- British Energy plc
- Caledonia Group, Inc.
- Cap Gemini Ernst & Young
- Cargill
- CB Hillier Parker
- Cemex Cental SAD CV
- ChevronTexaco
- Chiron
- CIBC World Markets
- City of Palo Alto
- CNF Inc
- Colorado Springs Utilities
- Commonwealth Energy Advisors
- Con Edison Energy
- Conoco
- Corpomtle Value Advisors
- Crisp Hughes Evans LLP
- Decision Strategies
- Department of Interior
- Discovision Associates
- Duke Energy
- ECS Risk Control
- Editions MEV
- Eli Lilly & Company
- EMI Music Publishing
- eNMARKET
- Entergy Services
- Enviros
- Equiva Trading
- EURESAS
- Exelon Power Team
- Foamex
- GE Capital
- GE Power Systems
- Gemplus Corp
- Gerald Eve
- Gibralter Business Appraisals, Inc.
- Glaxo SmithKline
- GMO
- Goodyear
- Halliburton Energy Services
- Hewlett Packard
- Hostcentric, Inc
- INAVISIS
- Ingersoll-Rand
- Intel Corporation
- Intecap
- Iowa State University
- ITESM
- Janssen Pharmaceutica Products
- Johns Mansville
- Johnson & Johnson
- Kawasumi Laboratories America
- Keyspan Corporate Services
- Lafarge North America
- Lloyds Bank TSB
- Louis Dreyfus
- Michigan State University
- Monitor Group
- Motorola
- MYOB Australia Pty, Ltd.
- Nahle & Company, S.C.
- Navigant Consulting, Inc.
- NE Public Power District
- NOVA Chemicals Corporation
- Occidental Oil & Gas Corp
- Oklahoma Gas & Electric
- Panorama Research
- Pfizer
- PG&E
- Phillips 66 Company RM&T
- Pinnacle West
- Pioneer Hi Bred International, Inc.
- PolyOne Corp
- Public Service of West Virginia
- Rack Space
- Renessen LLC
- Roche Diagnostics Corporation
- Rohm and Haas Company
- Russell, Ronnie
- Salomon Smith Barney
- Schlumberger Doll Research
- SDI GmbH
- Seagate Technologies
- Selection Resource
- Sempra Energy
- Shell International Holdings Limited
- Six Sigma Systems, Inc.
- Software Spectrum
- Sprint PCS
- Steve Shaw Associates
- StorageTek
- Strategic Decisions Group
- Sunoco, Inc.
- Syngenta Biotechnology
- Timken Company
- Total Fina Elf
- UCS Investment Co.
- Union Pacific Railroad
- United States Sugar Corporation
- Washington Gas
- Williams Communications
- American College
- Arizona State University
- Baylor University
- Boston College
- Capella University
- Chung-Ang University (South Korea)
- Colorado School of Mines
- Cornell University
- Dartmouth College
- Georgetown University
- IESA
- Iowa State University
- ITESM (Mexico)
- Michigan State University
- MIT
- New York University
- Norwegian University
- Open University (Germany)
- Oregon Graduate Institute of Tech
- Otto Beisheim Graduate (Germany)
- Pennsylvania State University
- Southern New Hampshire University
- Stockholm University (Sweden)
- Universidad de los Andes (Chile)
- Universidad Simon (South America
- Universitat Bern Institut (Germany)
- University of Alaska
- University of Albany (Canada)
- University of Alberta
- University of Cape Town (Africa)
- University of Chile (Chile)
- University of Cincinnati
- University of Cordoba (Central America)
- University of Denver
- University of Florida
- University of North Carolina
- University of North Dakota
- University of Pennsylvania Wharton School
- University of Siegen (Europe)
- University of Wisconsin
- University of Wuppertal
- Wayne State University

Risk Analysis Training DVD

TRAINING DVDs COVERING:

Monte Carlo Simulation with Risk Simulator

- Applied simulation statistics
- Choosing the relevant distributions
- Correlated and truncated simulation
- Interpreting simulation results
- Multidimensional simulation and profiling

Forecasting with Risk Simulator

- Box-Jenkins ARIMA modeling
- Multivariate regression analysis
- Stochastic process forecasting
- Time-series forecasting and nonlinear extrapolation

Optimization with Risk Simulator

- Continuous optimization
- Decision analysis tools
- Integer optimization

Real Options Analysis with Real Options Super Lattice Solver

- Basics of real options analysis
- Integrated risk analysis process and volatility estimates
- Solving different real options using SLS including abandonment, American, barrier, Bermudan, chooser complex custom, contraction, European, expansion, sequential compound, switching, multi-asset and multiphased complex sequential compound and many others

Analytical Tools

- Distributional fitting
- Hypothesis testing
- Nonparametric bootstrap simulation
- Sensitivity analysis, tornado charts and spider charts

Real Options Valuation, Inc.

Real Options Valuation, Inc. 4101-F Dublin Blvd., Suite 425, Dublin, CA 94568 USA +1.925.271.4438 www.realoptionsvaluation.com

TRAINING DVD

The training DVD comprises 10 DVDs and cover the following main topical areas:

- **Monte Carlo Simulation with Risk Simulator**
- **Forecasting with Risk Simulator**
- **Optimization with Risk Simulator**
- **Real Options Analysis with Real Options Super Lattice Solver**
- **Analytical Tools**

As part of the DVD Training set, you will receive 10 DVDs, a workbook with the slides and examples covered in the DVDs, and the following two books: *"Modeling Risk: Applying Monte Carlo Simulation, Real Options Analysis, Forecasting, and Optimization, 2nd Edition,"* by Dr. Johnathan Mun (Wiley Finance, 2006), and *"Real Options Analysis: Tools and Techniques, 2nd Edition,"* by Dr. Johnathan Mun (Wiley Finance 2005), and the relevant training models CD used in the lessons.

The lessons are developed and taught by Dr. Johnathan Mun, the creator of both the Risk Simulator and Real Options Super Lattice software, professor of finance and economics, author of many books on risk and real options, and CEO of Real Options Analysis, Inc. This is particularly important in terms of consistency and expertise as you learn the course material from the same person who developed the software, wrote the books and consults for major corporations.

In each DVD, there is an introduction to the topics to be covered, as well as learning outcomes of each module. Each DVD is divided up into various modules or chapters, and are summarized below:

DVD 1: Introduction to Risk Analysis
- Chapter 1: Introduction to the Training DVD
- Chapter 2: How are business decisions made?
- Chapter 3: What is risk and why should risk be considered?
- Chapter 4: Overview of Risk Analysis software applications

DVD 2: Monte Carlo Simulation with Risk Simulator
- Chapter 1: Overview of the Risk Simulator software
- Chapter 2: Profiling, assumptions, forecasts and running simulations
- Chapter 3: Interpreting the forecast statistics
- Chapter 4: Simulation run preferences and seed values
- Chapter 5: Running reports, saving and extracting simulation data

DVD 3: Advanced Simulation Techniques
- Chapter 1: Correlating and truncating distributions
- Chapter 2: Alternate parameters
- Chapter 3: Multidimensional simulations
- Chapter 4: Distributional fitting and choosing distributions
- Chapter 5: Due diligence and pitfalls in simulation

DVD 4: Simulation and Analytical Tools
- Chapter 1: Static tornado and spider charts
- Chapter 2: Dynamic sensitivity analysis
- Chapter 3: Hypothesis test on different distributions
- Chapter 4: Nonparametric bootstrap simulation
- Chapter 5: Precision control

DVD 5: Forecasting
- Chapter 1: Overview of forecasting techniques and data types
- Chapter 2: Forecasting without data
- Chapter 3: Time-series analysis forecasting
- Chapter 4: Nonlinear extrapolation
- Chapter 5: Multivariate regression analysis
- Chapter 6: Stochastic processes
- Chapter 7: Box-Jenkins ARIMA

DVD 6-7: Real Options Analysis: Theory and Background
- Chapter 1: Introduction to real options: what, where, who, when, how, and why
- Chapter 2: Sample applied business cases
- Chapter 3: Overview of different options valuation techniques: closed-form models, partial differential equations, and binomial lattices
- Chapter 4: Risk-neutral probability technique
- Chapter 5: Solving a basic European and American call option
- Chapter 6: Using Excel to solve basic American options
- Chapter 7: Solving basic abandonment, expansion, contraction, and mutually exclusive chooser options

DVD 8-9: Real Options Analysis: Application with SLS Software
- Chapter 1: Overview of the different SLS modules
- Chapter 2: Estimating Volatility (GARCH, Log PV Asset, Log Cash Flow Returns, management assumptions)
- Chapter 3: Solving options with changing inputs and customized exotic options
- Chapter 4: MSLS: Multiple sequential compound options
- Chapter 5: MNLS: Solving mean-reverting, jump-diffusion, and dual-asset rainbow options using trinomial, quadranomial, and pentanomial lattices
- Chapter 6: Framing real options—structuring the problem
- Chapter 7: The next steps…

DVD 10: Optimization with Risk Simulator
- Chapter 1: Introduction to optimization problems
- Chapter 2: Continuous optimization
- Chapter 3: Integer optimization

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 *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); *Modeling Risk: Applying Monte Carlo Simulation, Real Options Analysis, Forecasting and Optimization* (Wiley, 2006); *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).

TRAINING DVD CONTENTS

MODULE 1: Introduction to Risk Analysis (56 min)

Chapter 1: Introduction to the Training DVD **3:10**
- Welcome to the Training DVD and what to expect
- How to use the DVD
- Checklist of materials

Chapter 2: How Are Business Decisions Made? **12:09**

- Single-point estimates
- Scenario analysis
- Sensitivity analysis
- Flaw of averages

Chapter 3: What is Risk and Why Should Risk be Considered? **4:19**
- What risk analysis does
- Integrated risk analysis process

Chapter 4: Overview of Risk Analysis Software Applications **35:48**
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- Forecasting
- Analytical Tools
- Real Options Analysis
- Optimization

MODULE 2: Monte Carlo Simulation with Risk Simulator (1 hour)

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- Overview of Risk Simulator's 4 different modules
- Overview of the Risk Simulator menu and icon bars

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- Creating and editing Simulation Profiles and their uses
- Setting Assumptions
- Setting Forecasts
- Running Simulations

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- Forecast chart
- Basic forecast statistics: the four moments

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- Spider analysis

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- Basics of hypothesis testing
- Two distribution hypothesis test

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- Comparing empirical bootstrap with theoretical hypothesis test

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- Different techniques in forecasting

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- Using executive assumptions and the Delphi method

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- Interpreting the forecast report

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- Binomial lattice approach

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- Types of optimizations

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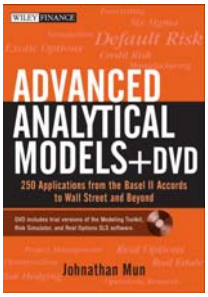
- Examples of integer optimization



Advanced Analytical Models: Over 800 Models and 300 Applications from the Basel II Accords to Wall Street and Beyond

Dr. Johnathan Mun
Hard Cover and Cloth: 1,000 Pages
Available on www.amazon.com
ISBN: 9780470179215 (2008)

Advanced Analytical Models is a large collection of advanced models with a multitude of industry and domain applications. The book is based on years of academic research and practical consulting experience, coupled with domain expert contributions. The Modeling Toolkit software that holds all the models, Risk Simulator risk simulation software, and Real Options SLS software were all developed by the author, with over 1,000 functions, tools, and model templates in these software applications. The trial versions are included in the accompanying DVD. The applications covered are vast. Included are Basel II banking risk requirements (credit risk, credit spreads, default risk, value at risk, etc.) and financial analysis (exotic options and valuation), risk analysis (stochastic forecasting, risk-based Monte Carlo simulation, optimization), real options analysis (strategic options and decision analysis), Six Sigma and quality initiatives, management science and statistical applications, and including everything in between, such as applied statistics, manufacturing, operations research, optimization, forecasting, and econometrics.

This book is targeted at practitioners who require the algorithms, examples, models, and insights in solving more advanced and even esoteric problems. This book does not only talk about modeling or illustrate basic concepts and examples; it comes complete with a DVD filled with sample modeling videos, case studies, and software applications to help you get started immediately. In other words, this book dispenses with all the theoretical discussions and mathematical models which are extremely hard to decipher and apply in the real business world. Instead, these theoretical models have been coded up into user-friendly and powerful software, and this book shows the reader how to start applying advanced modeling techniques almost immediately. The trial software applications allow you to access the approximately 300 model templates and 800 functions and tools, understand the concepts, and use embedded functions and algorithms in their own models. In addition, you can get run risk-based Monte Carlo simulations and advanced forecasting methods, and perform optimization on a myriad of situations as well as structure and solve customized real options and financial options problems.

Each model template that comes in the Modeling Toolkit software is described in this book. Descriptions are provided in as much detail as the applications warrant. Some of the more fundamental concepts in risk analysis and real options are covered in the author's other books. It is suggested that these books, Modeling Risk: Applying Monte Carlo Simulation, Real Options Analysis, Stochastic Forecasting, and Portfolio Optimization (2006) and Real Options Analysis, Second Edition (2005), both published by John Wiley & Sons, be used as references for some of the models in this book. Those modeling issues that are, in the author's opinion, critical, whether they are basic issues or more advanced analytical ones, are presented in detail. As software applications change continually, it is recommended that you check the author's Web site (www.realoptionsvaluation.com) frequently for any analytical updates, software upgrades, and revised or new models.

ABOUT THE AUTHOR

Dr. Johnathan C. Mun is the founder, chairman and CEO of Real Options Valuation, Inc. (ROV), a consulting, training, and software development firm specializing in strategic real options, financial valuation, Monte Carlo simulation, stochastic forecasting, optimization, and advanced analytics located in northern Silicon Valley, California. ROV has partners around the world including Beijing, Chicago, Colombia, Hong Kong, Mexico City, New York, Nigeria, Shanghai, Singapore, Spain, Zurich, and other locations. ROV also has a local office in Shanghai. He is also the chairman of the International Institute of Professional Education and Research (IIPER), an accredited global organization providing the Certified in Risk Management (CRM) designation, among others, staffed by professors from named universities from around the world. He is the creator of multiple software tools including Risk Simulator, Real Options SLS, Modeling Toolkit, Basel II Modeler, ROV Modeler, ROV Optimizer, ROV Valuator, ROV Extractor and Evaluator, ROV Compiler, ROV BizStats, ROV Dashboard, Employee Stock Options Valuation software and others (some of these tools are showcased in this book), as well as the risk analysis Training DVD. He has authored ten books published by John Wiley & Sons and Elsevier Science, including *The Banker's Handbook on Credit Risk* (2008); *Advanced Analytical Models: 250 Applications from Basel II Accord to Wall Street and Beyond* (2008); *Modeling Risk: Applying Monte Carlo Simulation, Real Options, Optimization, and Forecasting* (2006); *Real Options Analysis: Tools and Techniques, First and Second Editions* (2003 and 2005); *Real Options Analysis Course: Business Cases* (2003); *Applied Risk Analysis: Moving Beyond Uncertainty* (2003); and *Valuing Employee Stock Options* (2004). His books and software are being used at top universities around the world. Dr. Mun is also currently a finance and economics professor and has taught courses in financial management, investments, real options, economics, and statistics at the undergraduate and the graduate MBA levels. He teaches and has taught at universities all over the world, from the U.S. Naval Postgraduate School (Monterey, California) and University of Applied Sciences (Switzerland and Germany) as full professor, to Golden Gate University (California) and San Francisco State University (California) as adjunct professor, and has chaired many graduate research MBA thesis and Ph.D. dissertation committees. He was formerly the Vice President of Analytics at Decisioneering, Inc. Before that, he was a Consulting Manager and Financial Economist in the Valuation Services and Global Financial Services practice of KPMG Consulting and a Manager with the Economic Consulting Services practice at KPMG LLP. He has taught and consulted for over 100 multinational firms (former clients include 3M, Airbus, Boeing, BP, Chevron Texaco, Financial Accounting Standards Board, Fujitsu, GE, Microsoft, Motorola, Pfizer, Timken, U.S. Department of Defense, State and Local Governments, Veritas, and many others). His experience prior to joining KPMG included being department head of financial planning and analysis at Viking Inc. of FedEx, performing financial forecasting, economic analysis, and market research.

Dr. Mun received his PhD in Finance and Economics from Lehigh University, where his research and academic interests were in the areas of investment finance, econometric modeling, financial options, corporate finance, and microeconomic theory. He also has an MBA in business administration, an MS in management science, and a BS in Biology and Physics. He is Certified in Financial Risk Management (FRM), Certified in Financial Consulting (CFC), and Certified in Risk Management (CRM). He is a member of the American Mensa, Phi Beta Kappa Honor Society, and Golden Key Honor Society as well as several other professional organizations, including the Eastern and Southern Finance Associations, American Economic Association, and Global Association of Risk Professionals. In addition, he has written many academic articles published in the Journal of the Advances in Quantitative Accounting and Finance, the Global Finance Journal, the International Financial Review, the Journal of Financial Analysis, the Journal of Applied Financial Economics, the Journal of International Financial Markets, Institutions and Money, the Financial Engineering News, and the Journal of the Society of Petroleum Engineers.

PRAISES FOR *REAL OPTIONS ANALYSIS*

Advanced Analytical Models contain many powerful and useful applications ranging from R&D strategy valuation and Six Sigma models to risk simulation and strategic options. A must-have book for those starting out in Excel modeling to advanced modelers. An excellent resource for those applying stochastic models for portfolio project prioritization and valuation."
-Dr. Robert Finocchiaro, Technical Director, Corporate R&D Services, The 3M Company

Dr. Johnathan Mun is one of the most gifted teachers of quantitative risk analysis in the history of global finance and business. All of his books combine science, art, intuition, creativity, and above all, they are acutely perceptive, always practical, and provide startling clarity, on the methods and pathways of proper business decision making, when faced with uncertainty. Advanced Analytical Models contains a vast treasure trove of over 800 models, unlike anything ever published in the field. Absolutely groundbreaking…The practical application of the risk models in this book, will keep the rest of us busy, for years to come.
-Brian Watt, CRM, Chief Risk Officer and Chief Financial Officer, GECC

Dr. Mun's expertise in real options and practical modeling methodologies in real world cases is superb, and was used to value technologies in the U.S. military's Improved Engineering Design Process. His approach quantified real net benefits when considering the knowledge reuse on an enterprise scale and his approach is the most powerful when business value is most difficult to quantify.
-Dr. Ali Farsaie, President & CEO, Spatial Integrated Systems, Inc.

"Dr. Mun's latest book is scholarly strong and practically meaningful, by successfully synthesizing all aspects of risk and analytical models and presents them in a well-integrated manner. It is a must-read for both practitioners and students in the field of risk management. The Basel II risk analysis is covered extensively through real examples. With in-depth coverage of the most important and practical models, Dr. Mun's book has set a high standard of publishing in the area of analytical models, risk and decision analysis. The book has significant practical contributions at all levels of risk management. I strongly recommend this book to all readers who want to gain a clear and applied understanding of risk and analytical models.
-Dr. Ehsan Nikbakht, CFA, FRM, PRM, Professor of Finance, Zarb School of Business, Hofstra University, New York

An outstanding collection of important analytic models that span numerous disciplines and can be used in a wide range of industries. The models and their underlying discussion are sound and can be applied as is or modified by the reader for their own applications. The well-written book together with the trial software and models are a powerful combination and provide an exceptional learning opportunity for the reader. This material should be valuable to both analysts and managers who need a sound analytical framework to help them develop and support their decisions.
-Dr. Edmund H. Conrow, CRM, PMP, Risk Management Consultant/Author

Dr. Mun has created 'The Encyclopedia of Models', which addresses a wide-range of cross-industry and cross-enterprise analytical challenges. The models span the spectrum – from simple techniques that one can perform in a few minutes to advanced problems that are tackled in a robust manner. Dr Mun's new book will show you how to combine analytical methods to point at the right answers. Three words to sum it up: Comprehensive, Lucid, and, Elegant. Every aspiring and accomplished analyst needs to have this book in their library.
-Mark A. Benyovszky, Managing Director, -Zero Delta Center for Enterprise Alignment and Zero Delta University

Risk simulation, binomial lattices, and other computational models have not been within effective reach for many in-the-trenches professionals who did not get this training years ago. Through this book, on top his other books before it, and through his software, Dr. Mun has explained the mysteries, made available the tools, and continues to publish example upon example of how these models can be applied to improve the professional work we've been doing. Once in a while, a new thought leader emerges with a train long enough for the rest of us to ride to attain a new level of professionalism – Dr. Mun is one of these.
-James F. Joyner III, CPA/ABV, CVA, CPC, AIFA, Managing Member, Integra Benefits Consulting LLC

The mechanics of risk and options analyses are simple, but successful real-life application is all about the art of framing which requires constant practice. This book is a framing-fitness work-out through an extraordinary variety of recipes. Framing is not just for modeling, without it, decision making under uncertainties is much harder than it already is. If the answer is not explicit in an example, it is likely to exist as a variant in another – reading them triggered solutions to two commodity related problems that have plagued me for some time.
-Fanton Chuck, Chief Executive Officer, Renova Energy plc

Over the years Johnathan Mun's books have become our corporate bibles with multiple copies in our library. We have recently made the big switch over to Dr. Mun's Modeling Toolkit, Risk Simulator, and Real Options SLS because we found it easier to use while still being more sophisticated and flexible for our needs. "Advanced Analytical Models" is designed to complement the software and is just packed with useful real-life models that are directly applicable to our consulting work. The small refinements such as being able to specify the random number sequence so that you actually can get the same results in a live presentation reflect his sensitivity and understanding of the consulting environment. We have found his Real Options SLS invaluable in helping hospitals understand the different phasing options available to them when contemplating seemingly unreachable $500M capital projects. Dr. Mun's genius lies in his ability to take extremely complex theory and bring it down to the level that the rest of us can understand and easily apply to our respective fields. Entertaining as always, who ever thought we would get a book on advance analytics that was actually funny! For an industry (healthcare) that increasingly has to forecast 10 and 15 years into the future while still relying on "budget period" analytics and single point estimates, Dr. Mun's book is a "light in the storm." Numerous healthcare examples from queuing theory to methods for analyzing surgical outcomes bring serious analytics into the realm of the practical.
-Lawrence D. Pixley, FACMPE, Founding Partner, Stroudwater Associates

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This book covers the following applications:

Modeling Toolkit

- **Over 800 functions, models and tools and over 300 Excel and SLS templates**
- **Covering the following applications:**
- **Business analytics and statistics (CDF, ICDF, PDF, data analysis, integration)**
- **Credit and Debt Analysis (credit default swap, credit spread options, credit rating, debt options and pricing)**
- **Decision Analysis (decision tree, Minimax, utility functions)**
- **Exotic Options (over 100 types of financial and exotic options)**
- **Forecasting (ARIMA, econometrics, EWMA, GARCH, nonlinear extrapolation, spline, time-series)**
- **Industry Applications (banking, biotech, insurance, IT, real estate, utility)**
- **Operations Research and Portfolio Optimization (continuous, discrete, integer)**
- **Options Analysis (BDT interest lattices, debt options, options trading strategies)**
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- **Probability of Default and Banking Credit Risk (private, public and retail debt, credit derivatives and swaps)**
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- **Risk Hedging (delta and delta-gamma hedges, foreign exchange and interest rate risk)**
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Risk Simulator

- **Over 25 statistical distributions**
- **Covering the following applications:**
- **Applied Business Statistics (descriptive statistics, CDF/ICDF/PDF probabilities, stochastic parameter calibration)**
- **Bootstrap Simulation and Hypothesis Testing (testing empirical and theoretical moments)**
- **Correlated Simulations (simulation copulas and Monte Carlo)**
- **Data Analysis and Regression Diagnostics (heteroskedasticity, multicollinearity, nonlinearity, outliers)**
- **Forecasting (J-S curves, Markov chains, multivariate regressions, stochastic processes)**
- **Optimization (static, dynamic, stochastic)**
- **Sensitivity Analysis (correlated sensitivity, scenario, spider, tornado)**

Real Options SLS

- **Fully Customizable Binomial, Trinomial, Quadranomial and Pentanomial Lattices**
- **Lattice Makers (simulated lattices)**
- **Super fast super lattice algorithms (running thousands on lattice steps in seconds)**
- **Covering the following applications:**
- **Exotic Options Models (barriers, benchmarked, multiple assets, portfolio options)**
- **Financial Options Models (3D dual asset exchange, single and double barriers)**
- **Real Options Models (abandon, barrier, contract, expand, sequential compound, switching)**
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Employee Stock Options Valuation Toolkit

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- **Binomial and closed-form models**
- **Covers:**
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- **Changing Volatility**
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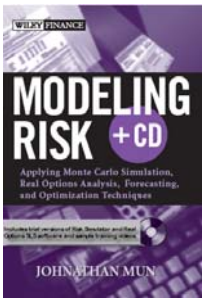
- **Vesting**



Modeling Risk: Applying Monte Carlo Simulation, Real Options Analysis, Stochastic Forecasting, and Optimization,

Dr. Johnathan Mun
ISBN: 0471789003 (2006)
Hard Cover and Cloth, 610 Pages
Available on www.amazon.com
Keyword: JOHNATHAN MUN

We live in an environment fraught with risk and operate our businesses in a risky world, as higher rewards only come with risks. It is unimaginable if the element of risk is not considered when corporate strategy is framed and when tactical projects are implemented. Modeling Risk provides a novel view of evaluating business decisions, projects, and strategies by taking into consideration a unified strategic portfolio analytical process. The book provides a qualitative and quantitative description of risk, as well as introductions to the methods used in identifying, quantifying, applying, predicting, valuing, hedging, diversifying, and managing risk, through rigorous examples of the methods' applicability in the decision-making process.

Pragmatic applications are emphasized in order to demystify the many elements inherent in risk analysis. A black box will remain a black box if no one can understand the concepts despite its power and applicability. It is only when the black box becomes transparent that analysts can understand, apply, and convince others of its results, value-add, and applicability, that the approach will receive wide-spread influence. This is done through step-by-step applications of risk analysis as well as presenting multiple business cases, and discussing real-life applications. This book is targeted at both the uninitiated professional as well as those verbose in risk analysis—there is always something for everyone. It is also applicable for use as a second-year M.B.A. level or introductory Ph.D. textbook. A CD-ROM is included in the book, including a trial version of the Risk Simulator and Real Options SLS software, and associated Excel models.

ABOUT THE AUTHOR

Dr. Johnathan C. Mun is the founder, chairman and CEO of Real Options Valuation, Inc. (ROV), a consulting, training, and software development firm specializing in strategic real options, financial valuation, Monte Carlo simulation, stochastic forecasting, optimization, and advanced analytics located in northern Silicon Valley, California. ROV has partners around the world including Beijing, Chicago, Colombia, Hong Kong, Mexico City, New York, Nigeria, Shanghai, Singapore, Spain, Zurich, and other locations. ROV also has a local office in Shanghai. He is also the chairman of the International Institute of Professional Education and Research (IIPER), an accredited global organization providing the Certified in Risk Management (CRM) designation, among others, staffed by professors from named universities from around the world. He is the creator of multiple software tools including *Risk Simulator, Real Options SLS, Modeling Toolkit, Basel II Modeler, ROV Modeler, ROV Optimizer, ROV Valuator, ROV Extractor and Evaluator, ROV Compiler, ROV BizStats, ROV Dashboard, Employee Stock Options Valuation* software and others (some of these tools are showcased in this book), as well as the risk analysis Training DVD. He has authored ten books published by John Wiley & Sons and Elsevier Science, including *The Banker's Handbook on Credit Risk* (2008); *Advanced Analytical Models: 250 Applications from Basel II Accord to Wall Street and Beyond* (2008); *Modeling Risk: Applying Monte Carlo Simulation, Real Options, Optimization, and Forecasting* (2006); *Real Options Analysis: Tools and Techniques, First and Second Editions* (2003 and 2005); *Real Options Analysis Course: Business Cases* (2003); *Applied Risk Analysis: Moving Beyond Uncertainty (2003); and Valuing Employee Stock Options* (2004). His books and software are being used at top universities around the world. Dr. Mun is also currently a finance and economics professor and has taught courses in financial management, investments, real options, economics, and statistics at the undergraduate and the graduate MBA levels. He teaches and has taught at universities all over the world, from the U.S. Naval Postgraduate School (Monterey, California) and University of Applied Sciences (Switzerland and Germany) as full professor, to Golden Gate University (California) and San Francisco State University (California) as adjunct professor, and has chaired many graduate research MBA thesis and Ph.D. dissertation committees. He was formerly the Vice President of Analytics at Decisioneering, Inc. Before that, he was a Consulting Manager and Financial Economist in the Valuation Services and Global Financial Services practice of KPMG Consulting and a Manager with the Economic Consulting Services practice at KPMG LLP. He has taught and consulted for over 100 multinational firms (former clients include 3M, Airbus, Boeing, BP, Chevron Texaco, Financial Accounting Standards Board, Fujitsu, GE, Microsoft, Motorola, Pfizer, Timken, U.S. Department of Defense, State and Local Governments, Veritas, and many others). His experience prior to joining KPMG included being department head of financial planning and analysis at Viking Inc. of FedEx, performing financial forecasting, economic analysis, and market research.

Dr. Mun received his Ph.D. in Finance and Economics from Lehigh University, where his research and academic interests were in the areas of investment finance, econometric modeling, financial options, corporate finance, and microeconomic theory. He also has an MBA in business administration, an MS in management science, and a BS in Biology and Physics. He is Certified in Financial Risk Management (FRM), Certified in Financial Consulting (CFC), and Certified in Risk Management (CRM). He is a member of the American Mensa, Phi Beta Kappa Honor Society, and Golden Key Honor Society as well as several other professional organizations, including the Eastern and Southern Finance Associations, American Economic Association, and Global Association of Risk Professionals. In addition, he has written many academic articles published in the Journal of the Advances in Quantitative Accounting and Finance, the Global Finance Journal, the International Financial Review, the Journal of Financial Analysis, the Journal of Applied Financial Economics, the Journal of International Financial Markets, Institutions and Money, the Financial Engineering News, and the Journal of the Society of Petroleum Engineers.

PRAISES FOR *REAL OPTIONS ANALYSIS*

Johnathan Mun's book is a sparkling jewel in my finance library. Mun demonstrates a deep understanding of the underlying mathematical theory in his ability to reduce complex concepts to lucid explanations and examples. For this reason, he's my favorite writer in this field. Experienced professionals will appreciate Mun's competence in boiling down complex math to a clear presentation of the essential solutions to financial risk, corporate finance, and forecasting.
Janet Tavakoli
President, Tavakoli Structured Finance

Every year the market of managerial books is flooded again and again. This book is different. It puts a valuable tool into the hands of corporate managers, who are willing to stand up against uncertainties and risks and are determined to deliver value to shareholder and society even in rough times. It is a book for the new generation of managers, for whom Corporate America is waiting.
Dr. Markus Götz Junginger
Managing Partner, IBCOL Consulting AG (Switzerland)

Dr. Mun breaks through the hyperbole and presents a clear step-by-step approach revealing to readers how quantitative methods and tools can truly make a difference. In short, he teaches you what's relevant and a must know. I highly recommend this book, especially if you want to effectively incorporate the latest technologies into your decision making process for your real world business.
Dr. Paul W. Finnegan, MD, MBA
Vice President, Commercial Operations and Development
Alexion Pharmaceuticals, Inc.

Johnathan Mun has previously published a number of very popular books dealing with different aspects of risk analysis, associated techniques and tools. This last publication puts all the pieces together. The book is really unavoidable for any professional who wants to address risk evaluation following a logical, concrete and conclusive approach.
Jean Louis Vaysse
Deputy Vice President Marketing, Airbus (France)

A must read for product portfolio managers... it captures the risk exposure of strategic investments, and provides management with estimates of potential outcomes and options for risk mitigation.
Rafael E. Gutierrez
Executive Director of Strategic Marketing and Planning, Seagate Technology

Mun has the uncanny ability to clarify the complex, distilling risk analysis concepts into a truly readable and practical guide for decision-makers. This book blazes a trail that connects abstract yet powerful theories with real-world applications and examples, leaving the reader enlightened and empowered.
Stephen Hoye, MBA
President, Hoye Consulting Group

Strategy development has fallen on hard times being judged not relevant for a rapidly changing world. With this book, Dr. Mun attacks this poor excuse head-on by presenting a clearly organized, tool supported, methodology that logically progresses from exploring uncertainty that bounds risk to the creation of options for constructing realistic business strategies.
Robert Mack
Vice President, Distinguished Analyst, Gartner Group

This book is a pleasure to read both for subject matter experts as well as for novices. It holds a high risk of addicting the readers. Dr. Mun leads the readers through step by step complex mathematical concepts with unmatched ease and clarity. Well chosen examples and pointers to pitfalls complement the splendidly written chapters. This book will be a bestseller in Risk Management and is a "must read" for all professionals.
Dr. Hans Weber
Syngenta AG (Switzerland), Product Development Project Leader

Once again, Dr. Johnathan Mun has attained his usual standard: excellence in making not-so-simple but very useful quantitative analytical techniques accessible to the interested reader who doesn't necessarily have an engineering or scientific training. This book presents a seriously comprehensive guide to everyday users of spreadsheet models, particularly those interested in Risk Analysis and Management, on how to move beyond simple statistical analysis. It is a "must have" to academicians searching for user-friendly bibliography, and to practitioners willing to get a first-hand experience on cutting-edge, high-productivity analytical tools.
Dr. Roberto J. Santillan-Salgado
Director of the M.S., EGADE-ITESM, Monterrey Campus (Mexico)

A fundamental principal in finance is the relationship between risk and reward, yet today empirical risk measurement, valuations, and deal structuring are still the norm. Business professionals, venture capitalists and other investors will all find Johnathan Mun's latest book on conceptualizing and quantitatively measuring risk in business of considerable value and a welcome addition to their libraries.
Dr. Charles T. Hardy
Principal, Hardy & Associates

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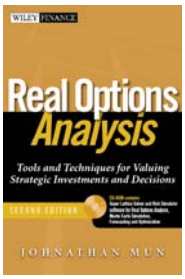

Real Options Analysis, 2nd Edition: Tools and Techniques for Valuing Strategic Investments & Decisions

Dr. Johnathan Mun
ISBN: 0471747483 (2005)
Hard Cover and Cloth, 670 Pages
Available on www.amazon.com
Keyword: JOHNATHAN MUN

Real Options Analysis, 2nd edition provides a novel view of evaluating capital investment strategies by taking into consideration the strategic decision-making process. The book provides a qualitative and quantitative description of real options, the methods used in solving real options, why and when they are used, and the applicability of these methods in decision making. In addition, multiple business cases and real-life applications are discussed. This includes presenting and framing the real options problems, as well as introducing a stepwise quantitative process developed by the author for solving these problems using the different methodologies inherent in real options. Included are technical presentations of models and approaches used as well as their theoretical and mathematical justifications. The book is divided into three parts: the qualitative discussions of real options; the quantitative analysis and mathematical concepts; and practical applications. The first part looks at the qualitative nature of real options, providing actual business cases and scenarios of real options in the industry, as well as high-level explanations of how real options provide the much-needed insights in decision making. The second part of the book looks at the step-by-step quantitative analysis, complete with worked-out examples and mathematical formulae. The third part illustrates the use of the Real Options Valuation's Super Lattice Solver software and Risk Simulator software both developed by the author and included in the enclosed CD-ROM (standard 30-day trial with extended academic license). In this section, more detailed business cases are solved using the software.

This second edition provides many updates including:

- A trial version and introduction to the Real Options Super Lattice Solver software that supersedes the author's older Real Options Analysis Toolkit software (all bugs and computational errors have been fixed and verified).
- A trial version and introduction to the Risk Simulator software also created by the author.
- Extended examples and step-by-step computations of American, Bermudan, European, and Customized options (including abandon, barrier, chooser, contraction, expansion, and other options).
- More extensive coverage of advanced and exotic real and financial options (multiple-phased sequential compound options, complex sequential compound option, barrier options, trinomial mean-reverting options, quadranomial jump-diffusion options, pentanomial dual-asset rainbow options, multiple-asset with multiple-phased options, engineering your own exotic options, and so forth).
- Extended real options cases with step-by-step worked out solutions using the Super Lattice Solver software.
- Several brand new case studies on applying real options in the industry.
- An extended discussion on volatility estimates, risk, and uncertainty.
- This book is targeted at both the uninitiated professional as well as those well-versed in real options applications. It is also applicable for use as a second-year M.B.A. level textbook or introductory Ph.D. reference book.

ABOUT THE AUTHOR

Dr. Johnathan C. Mun is the founder, chairman and CEO of Real Options Valuation, Inc. (ROV), a consulting, training, and software development firm specializing in strategic real options, financial valuation, Monte Carlo simulation, stochastic forecasting, optimization, and advanced analytics located in northern Silicon Valley, California. ROV has partners around the world including Beijing, Chicago, Colombia, Hong Kong, Mexico City, New York, Nigeria, Shanghai, Singapore, Spain, Zurich, and other locations. ROV also has a local office in Shanghai. He is also the chairman of the International Institute of Professional Education and Research (IIPER), an accredited global organization providing the Certified in Risk Management (CRM) designation, among others, staffed by professors from named universities from around the world. He is the creator of multiple software tools including ***Risk Simulator, Real Options SLS, Modeling Toolkit, Basel II Modeler, ROV Modeler, ROV Optimizer, ROV Valuator, ROV Extractor and Evaluator, ROV Compiler, ROV BizStats, ROV Dashboard, Employee Stock Options Valuation*** software and others (some of these tools are showcased in this book), as well as the risk analysis Training DVD. He has authored ten books published by John Wiley & Sons and Elsevier Science, including ***The Banker's Handbook on Credit Risk*** (2008); ***Advanced Analytical Models: 250 Applications from Basel II Accord to Wall Street and Beyond*** (2008); ***Modeling Risk: Applying Monte Carlo Simulation, Real Options, Optimization, and Forecasting*** (2006); ***Real Options Analysis: Tools and Techniques, First and Second Editions*** (2003 and 2005); ***Real Options Analysis Course: Business Cases*** (2003); ***Applied Risk Analysis: Moving Beyond Uncertainty (2003); and Valuing Employee Stock Options*** (2004). His books and software are being used at top universities around the world. Dr. Mun is also currently a finance and economics professor and has taught courses in financial management, investments, real options, economics, and statistics at the undergraduate and the graduate MBA levels. He teaches and has taught at universities all over the world, from the U.S. Naval Postgraduate School (Monterey, California) and University of Applied Sciences (Switzerland and Germany) as full professor, to Golden Gate University (California) and San Francisco State University (California) as adjunct professor, and has chaired many graduate research MBA thesis and Ph.D. dissertation committees. He was formerly the Vice President of Analytics at Decisioneering, Inc. Before that, he was a Consulting Manager and Financial Economist in the Valuation Services and Global Financial Services practice of KPMG Consulting and a Manager with the Economic Consulting Services practice at KPMG LLP. He has taught and consulted for over 100 multinational firms (former clients include 3M, Airbus, Boeing, BP, Chevron Texaco, Financial Accounting Standards Board, Fujitsu, GE, Microsoft, Motorola, Pfizer, Timken, U.S. Department of Defense, State and Local Governments, Veritas, and many others). His experience prior to joining KPMG included being department head of financial planning and analysis at Viking Inc. of FedEx, performing financial forecasting, economic analysis, and market research.

Dr. Mun received his Ph.D. in Finance and Economics from Lehigh University, where his research and academic interests were in the areas of investment finance, econometric modeling, financial options, corporate finance, and microeconomic theory. He also has an MBA in business administration, an MS in management science, and a BS in Biology and Physics. He is Certified in Financial Risk Management (FRM), Certified in Financial Consulting (CFC), and Certified in Risk Management (CRM). He is a member of the American Mensa, Phi Beta Kappa Honor Society, and Golden Key Honor Society as well as several other professional organizations, including the Eastern and Southern Finance Associations, American Economic Association, and Global Association of Risk Professionals. In addition, he has written many academic articles published in the Journal of the Advances in Quantitative Accounting and Finance, the Global Finance Journal, the International Financial Review, the Journal of Financial Analysis, the Journal of Applied Financial Economics, the Journal of International Financial Markets, Institutions and Money, the Financial Engineering News, and the Journal of the Society of Petroleum Engineers.

PRAISES FOR *REAL OPTIONS ANALYSIS*

"…this book is a *must have* and *must read…* Dr. Mun's new book is a refreshing, cutting-edge look at a powerful new decision-making process… it isn't often you can truthfully say a book breaks new ground, but [this book] has certainly done that."
-Glenn G. Kautt, President, Monitor Group, Inc. (USA)

"Many books on real options can be intimidating. Dr. Mun offers a pragmatic, reliable and entertaining guide. Complex concepts and formulas are brilliantly interspersed with well chosen examples and step-by-step walk through from a variety of industries."
-Shota Hattori, President and CEO, Kozo Engineering, (Japan)

"Real Options Analysis is the clearest book on real options that we have read to date. It does an excellent job of demystifying a difficult and complex subject. It provides a solid basis for conceiving, assessing and evaluating real option investments, which will make it useful to practitioners and students alike."
-Ian C. MacMillan, Professor
The Wharton School of the University of Pennsylvania (USA)

"…the clarity and comprehensive coverage makes it the best guide for all practitioners… coupled with state-of-the-art financial tools CD-ROM."
-Michael Sim, Partner, Moores Rowland International (Hong Kong)

"Dr. Johnathan Mun certainly has earned the reputation of being an expert on the subject… consultants, analysts, decision-makers and engineers will be all over this book and its software."
-Phyllis Koessler, Managing Director, Koessler and Associates (Switzerland)

"…finally, a real options analysis book that is technically sophisticated enough to be useful, and practically written so that it can actually be used. It is destined to become the handbook of real options."
-Tracy Gomes, CEO, Intellectual Property Economics (USA)

"Dr. Mun demystifies real options analysis and delivers a powerful, pragmatic guide for decision-makers and practitioners alike. Finally, there is a book that equips professionals to easily recognize, value, and seize real options in the world around them."
- Jim Schreckengast, Sr. Vice President, R&D Strategy – Gemplus International SA (France)

"…written from the viewpoint of an educator and a practitioner, his book offers a readable reference full of insightful decision-making tools to satisfy both the novice and the experienced veteran."
-Richard Kish, Ph.D., Professor of Finance, Lehigh University (USA)

"Dr. Mun has converted his tacit financial knowledge into a digestible user-friendly book. He effectively leads the reader on a solid path starting from *discounted cash flow,* progressing through *Monte Carlo analysis* and evolving to *real options* to get even closer to the target of achieving confident corporate decisions. His ability to clearly explain the relationships of popular competing analysis methods will make this a must have reference book for today's decision makers."
-Ken English, Director of R&D, The Timken Company (USA)

"The book leads the field in real options analytics and is a must-read for anyone interested in performing such analyses. Dr. Mun has made a formidable subject crystal clear and exponentially easy for senior management to understand. *Monte Carlo simulation* and *real options* software alone is worth the book price many times over."
-Morton Glantz, Renowned educator in finance, author of several books, financial advisor to government (USA)

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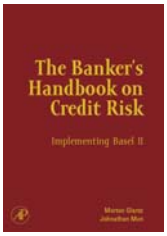

The Banker's Handbook on Credit Risk: Implementing Basel II

Morton Glantz & Johnathan Mun
Hard Cover and Cloth, 420 Pages
Available at www.amazon.com
ISBN: 9780123736666 (2008)

Much literature has been published on banking—and for bankers. The authors tell us how to derive clients' cash flows and financial needs but not how to model value drivers with the latest technology. They advise us how to analyze financial alternatives and choose what appears the best decision but not how to create choices germinal in a client's corporate data. They refer us to quantitative objective functions and many formulae. They do not give us the means to run up stochastic solutions, quickly and easily and thereby improve chances of ever being able to explain, qualitatively, optimal objectives on which any assessment of loss reserves, risk adjusted pricing and capital allocation must reside. They provide macrostructures but not how micro processes work, such as leveraging the latest stochastic technology to improve credit-decision making. Thanks in part to Basel II-–in the last few years, we have seen banking evolve from a casual discipline to a rigorous science. Just over a decade or so ago, technologies in the banking business such as neural nets, stochastic optimization, simulation, fuzzy logic, and data mining were still largely exploratory and at best quite tentative. Algorithms, as a term, rested on the outskirts of financial thought. More than a few bankers had not even heard of Monte Carlo outside of casinos and travel magazines. Machine learning was in its infancy while migration risk, default frequencies concepts were encased in the Stone Age logic of ratios, deterministic forecasts, rudimentary cash flows, and on more than a few occasions, front page accounting shenanigans. Yet, the concern is that some bankers are resisting computer-actualized solutions and are under the wrong impression the past will satisfy (Basel II) compliance. Quantitative methods, such as the use of advanced models or even the use of math, do not alarm sharp banking professionals. Modeling tools are not black boxes that ignore or inhibit wisdom or that mechanize the loan approval process. However, in many financial institutions, models and, for that matter, change may intimidate banking professionals, inhibiting technological growth and, alas, the requisite skills to participate in strategic Basel II decision making at the highest level. Otherwise capable bankers find it difficult to creatively deploy sophisticated modeling techniques to crystallize value drivers, explain optimal capital allocation strategies, and otherwise deliver the goods to their boss or to money committee. Knowledge gaps, particularly when it comes to the new world of banking are detrimental to continued growth both within the institution and in advancing one's career.

The hands-on applications covered in this book are vast, including areas of Basel II banking risk requirements (credit risk, credit spreads, default risk, value at risk, market risk, and so forth) and financial analysis (exotic options and valuation), to risk analysis (stochastic forecasting, risk-based Monte Carlo simulation, portfolio optimization) and real options analysis (strategic options and decision analysis). This book is targeted at banking practitioners and financial analysts who require the algorithms, examples, models, and insights in solving more advanced and even esoteric problems. This book does not only talk about modeling or illustrates some basic concepts and examples, but comes complete with a DVD filled with sample modeling videos, case studies, and software applications to help the reader get started immediately. The various trial software applications included allows the reader to quickly access the approximately 8000 modeling functions and tools, 250 analytical model templates, and powerful risk-based simulation software to help in the understanding and learning of the concepts covered in the book, and also to use the embedded functions and algorithms in their own models. In addition, the reader can get started quickly in running risk-based Monte Carlo simulations, run advanced forecasting methods, and perform optimization on a myriad of situations, as well as structure and solve customized real options and financial options problems. This book is unique in that it is a handbook or application-based book, and the focus is primarily to help the reader hit the ground running, and not delve into the theoretical structures of the models where there are a plethora of mathematical modeling and theory-laden books without any real hands-on applicability. Indeed, this book should help you carry out your decision making tasks more succinctly and might even empower you to grab the modeling hardball and to pitch winning games in a domain that is hot, dynamic, complex, and often combative.

ABOUT THE AUTHORS

Prof. Morton Glantz is a world renowned scholar in international banking and risk management. He serves as a financial advisor and educator to a broad spectrum of professionals, including corporate financial executives, government ministers, privatization managers, investment and commercial bankers, public accounting firms, members of merger and acquisition teams, strategic planning executives, management consultants, attorneys and representatives of foreign governments and international banks. As a senior officer of JP Morgan Chase, he built a progressive career path specializing in credit analysis and credit risk management, risk grading systems, valuation models and professional training. He was instrumental in the reorganization and development of the credit analysis module of the Bank's Management Training Program Finance, acknowledged at the time as one of the foremost training programs in the banking industry. A partial list of client companies Morton has worked with includes, Institutional Investor, The Development Bank of Southern Africa, CUCORP, Canada, The Bank of China, GE Capital, Cyprus Development Bank, Decisioneering, Iran Development Bank (Cairo), Gulf Bank (Kuwait), Institute for International Research (Dubai), Inter-American Investment Corporation, Ernst & Young, Euromoney, ICICI Bank (India), Council for Trade and Economic Cooperation (Russia), BHF Bank and IBM Credit Corporation. Morton is on the finance faculty at the Fordham Graduate School of Business. He has appeared in Harvard University International Directory of Business and Management Scholars and Research and earned Fordham University Deans Award for Faculty Excellence on three occasions. Professor Glantz is a Board Member, International Standards Board, International Institute of Professional Education and Research (IIPER). The International Institute of Professional Education and Research (IIPER) is a global institute with partners and offices around the world including the United States, Switzerland, Hong Kong, Mexico, Portugal, Singapore, Nigeria, Malaysia, and others. Professor Glantz is widely published in financial journals and authored 6 books including Banker's Handbook on Credit Risk (Elsevier 2008), Credit Derivatives: Techniques to Manage Credit Risk for Financial Professionals, (with Erik Banks and Paul Siegel), (McGraw Hill 2006), Optimal Trading Strategies, with Robert Kissell (AMACOM 2003), Managing Bank Risk: An Introduction to Broad-Base Credit Engineering, Academic Press/Elsevier (2002) RISKBOOK.COM Award: Best Finance Books of 2003, Scientific Financial Management (AMACOM 2000); Loan Risk Management (McGraw Hill. 1995).

Dr. Johnathan C. Mun is the founder, chairman and CEO of Real Options Valuation, Inc. (ROV), a consulting, training, and software development firm specializing in strategic real options, financial valuation, Monte Carlo simulation, stochastic forecasting, optimization, and advanced analytics located in northern Silicon Valley, California. ROV has partners around the world including Beijing, Chicago, Colombia, Hong Kong, Mexico City, New York, Nigeria, Shanghai, Singapore, Spain, Zurich, and other locations. ROV also has a local office in Shanghai. He is also the chairman of the International Institute of Professional Education and Research (IIPER), an accredited global organization providing the Certified in Risk Management (CRM) designation, among others, staffed by professors from named universities from around the world. He is the creator of multiple software tools including Risk Simulator, Real Options SLS, Modeling Toolkit, Basel II Modeler, ROV Modeler, ROV Optimizer, ROV Valuator, ROV Extractor and Evaluator, ROV Compiler, ROV BizStats, ROV Dashboard, Employee Stock Options Valuation software and others (some of these tools are showcased in this book), as well as the risk analysis Training DVD. He has authored ten books published by John Wiley & Sons and Elsevier Science, including The Banker's Handbook on Credit Risk (2008); Advanced Analytical Models: 250 Applications from Basel II Accord to Wall Street and Beyond (2008); Modeling Risk: Applying Monte Carlo Simulation, Real Options, Optimization, and Forecasting (2006); Real Options Analysis: Tools and Techniques, First and Second Editions (2003 and 2005); Real Options Analysis Course: Business Cases (2003); Applied Risk Analysis: Moving Beyond Uncertainty (2003); and Valuing Employee Stock Options (2004). His books and software are being used at top universities around the world. Dr. Mun is also currently a finance and economics professor and has taught courses in financial management, investments, real options, economics, and statistics at the undergraduate and the graduate MBA levels. He teaches and has taught at universities all over the world, from the U.S. Naval Postgraduate School (Monterey, California) and University of Applied Sciences (Switzerland and Germany) as full professor, to Golden Gate University (California) and San Francisco State University (California) as adjunct professor, and has chaired many graduate research MBA thesis and Ph.D. dissertation committees. He was formerly the Vice President of Analytics at Decisioneering, Inc. Before that, he was a Consulting Manager and Financial Economist in the Valuation Services and Global Financial Services practice of KPMG Consulting and a Manager with the Economic Consulting Services practice at KPMG LLP. He has taught and consulted for over 100 multinational firms (former clients include 3M, Airbus, Boeing, BP, Chevron Texaco, Financial Accounting Standards Board, Fujitsu, GE, Microsoft, Motorola, Pfizer, Timken, U.S. Department of Defense, State and Local Governments, Veritas, and many others). His experience prior to joining KPMG included being department head of financial planning and analysis at Viking Inc. of FedEx, performing financial forecasting, economic analysis, and market research. Dr. Mun received his PhD in Finance and Economics from Lehigh University, where his research and academic interests were in the areas of investment finance, econometric modeling, financial options, corporate finance, and microeconomic theory. He also has an MBA in business administration, an MS in management science, and a BS in Biology and Physics. He is Certified in Financial Risk Management (FRM), Certified in Financial Consulting (CFC), and Certified in Risk Management (CRM). He is a member of the American Mensa, Phi Beta Kappa Honor Society, and Golden Key Honor Society as well as several other professional organizations, including the Eastern and Southern Finance Associations, American Economic Association, and Global Association of Risk Professionals. In addition, he has written many academic articles published in the Journal of the Advances in Quantitative Accounting and Finance, Global Finance Journal, International Financial Review, Journal of Financial Analysis, the Journal of Applied Financial Economics, the Journal of International Financial Markets, Institutions and Money, Financial Engineering News, and Journal of the Society of Petroleum Engineers.

PRAISES FOR *THE BANKER'S HANDBOOK*

What sets Dr. Johnathan Mun's work apart from other writers and practitioners of quantitative risk analysis, is its startling clarity and real practical application to both the real world of risk analysis, and the processes by which we must make decisions under uncertainty. At GECC, we use both Dr. Mun's Risk Simulator and his Real Options software. Every book he has ever written is lined up within easy reach on my office bookshelf. His latest book, written with Morton Glantz, a well-known scholar in International Banking and Risk Management, is another gem. Read "The Banker's Handbook on Credit Risk" to see what two of the most original thinkers in quantitative risk analysis in the world today have to say about credit risk.
Brian Watt, CRM, Chief Financial Officer and Chief Risk Officer, GECC

The Banker's Handbook on Credit Risk is an indispensable reference for bankers and others concerned with credit risk to understand how to fully and properly utilize models in the management of credit risk. The comprehensive combination of explanatory text and over 150 working models in the book and accompanying DVD make it a key reference book for bankers. Most importantly, use of this Handbook and its accompanying models will move us forward in achieving sorely needed improvement in the management and regulatory oversight of credit risk in the financial system."
George J. Vojta, Chairman and CEO, The Westchester Group

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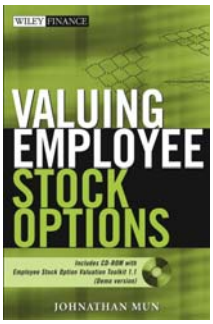

Valuing Employee Stock Options:
Under 2004 FAS 123 Proposals
(CD-ROM Included)

Dr. Johnathan Mun

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Hard Cover and Cloth
320 Pages

Available on www.amazon.com
Keyword search: JOHNATHAN MUN

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San Francisco, California

PREFACE

This book was written after FASB released its Proposed FAS 123 Revisions in March 2004. As one of the valuation consultants and FASB advisors on the FAS 123 initiative in 2003 and 2004, I would like to illustrate to the finance and accounting world that what FASB has proposed is actually pragmatic and applicable. I am neither for nor against the expensing of employee stock options and would recuse myself from the philosophical and sometimes emotional debate on whether employee stock options should be expensed (that they are a part of an employee's total compensation, paid in part for the exchange of services, and are an economic opportunity cost to the firm just like restricted stocks or other contingent claims issued by the company) or should not be expensed (that they simply dilute the holdings of existing shareholders, is a cashless expense, and if expensed, provides no additional valuable information to the general investor as to the financial health of the company but reduces the company's profitability and hence the ability to continue issuing more options to its employees). Rather, as an academic and valuation expert, my concern is with creating a universal standard of understanding on how FAS 123 can be uniformly applied to avoid ambiguity, and not whether employee stock options should be expensed. Therefore, let it not be said that the new ruling is abandoned because it is not pragmatic. This book is also my response to FASB board member Katherine Schipper's direct request to myself at the FASB public panel roundtable meeting (Palo Alto, California, June 2004) for assistance in providing more guidance on the overall valuation aspects of FAS 123.

Hopefully the contents of this book will subdue some of the criticisms on how binomial lattices can be used and applied in the real world. The results, tables, graphics, and sample cases illustrated throughout the book were calculated using customized binomial lattice software algorithms I developed to assist FASB in its deliberations, and were based on actual real-life consulting and advisory experience on applying FAS 123. Inexperienced critics will be surprised at some of the findings in the book. For instance, criticisms on the difficulty of finding the highly critical volatility may be unfounded because when real-life scenarios such as vesting, forfeitures, and suboptimal exercise behavior are added to the model, volatility plays a much smaller and less prominent role. In addition, the book illustrates how Monte Carlo simulation with correlations can be added (to simulate volatility, suboptimal exercise behavior multiple, forfeiture rates, as well as other variables for thousands and even hundreds of thousands of simulation scenarios and trials) to provide a precision of up to $0.01 at a 99.9 percent statistical confidence, coupled with a convergence test of the lattice steps, provides a highly robust modeling methodology. Future editions of this book will include any and all changes to the FAS 123 requirements since the March 2004 proposal. Parts One and Four are written specifically for the chief financial officer and finance directors, who are interested in understanding what are the impacts and implications of using a binomial lattice versus a Black-Scholes model. Parts Two and Three are targeted more toward the analysts, consultants, and accountants who require the technical knowledge and example cases to execute the analysis.

PRAISES FOR *REAL OPTIONS ANALYSIS*

"Veritas has modeled the valuation of its employee stock options for analytical purposes using a proprietary customized binomial lattice, developed by Dr. Johnathan Mun. The valuation based on the customized binomial lattice model allows us to take into account the impacts of multiple vesting periods, employee suboptimal exercise behavior, forfeiture rates, changing risk-free rates, and changing volatilities over the life of the option which are required under the 2004 FAS 123 issued by the Financial Accounting Standards Board. It is not possible to consider these factors in a valuation based on the traditional modified Black-Scholes model. Under the assumptions used by Veritas when modeling the valuation of employee stock option grants both based on the customized binomial lattice model as well as the traditional modified Black-Scholes model, the customized binomial lattice model resulted in a considerably lower expense, considering the expensing guidelines as included in the FAS 123 Proposed Statement."

Don Rath, Vice President of Tax and Stock Administration
Veritas Software Corporation

"This is one of those rare books written in anticipation of a major shift in the industry and economy. FAS 123 will throw a lot of public companies in a frantic, however the smart ones are identifying the opportunity to master the process and take over the driving seat. The methodology and the tools developed by Dr. Johnathan Mun are proven, pragmatic, and offer a great deal of value and benefit to those early adopters. IBCOL Consulting AG is using Dr. Mun's algorithms and methodology because of their applicability, accuracy, and the fair-market values that we have obtained for our clients are significantly less than traditional Black-Scholes models."

Dr. Markus Junginger
Managing Partner, IBCOL Consulting

"After extensive review of the FASB exposure draft and consideration of a variety of option valuation methodologies, E*TRADE FINANCIAL has decided to implement a binomial lattice model in Equity Edge, our stock plan management and reporting software, in consultation with Dr. Johnathan Mun. We found Dr. Mun's work on employee stock option pricing very valuable."

Naveen Agarwal
Director, Product Management, E*TRADE FINANCIAL Corporate Services

ABOUT THE AUTHOR

Dr. Johnathan C. Mun is the founder, chairman and CEO of Real Options Valuation, Inc. (ROV), a consulting, training, and software development firm specializing in strategic real options, financial valuation, Monte Carlo simulation, stochastic forecasting, optimization, and advanced analytics located in northern Silicon Valley, California. ROV has partners around the world including Beijing, Chicago, Colombia, Hong Kong, Mexico City, New York, Nigeria, Shanghai, Singapore, Spain, Zurich, and other locations. ROV also has a local office in Shanghai. He is also the chairman of the International Institute of Professional Education and Research (IIPER), an accredited global organization providing the Certified in Risk Management (CRM) designation, among others, staffed by professors from named universities from around the world. He is the creator of multiple software tools including ***Risk Simulator, Real Options SLS, Modeling Toolkit, Basel II Modeler, ROV Modeler, ROV Optimizer, ROV Valuator, ROV Extractor and Evaluator, ROV Compiler, ROV BizStats, ROV Dashboard, Employee Stock Options Valuation*** software and others (some of these tools are showcased in this book), as well as the risk analysis Training DVD. He has authored ten books published by John Wiley & Sons and Elsevier Science, including ***The Banker's Handbook on Credit Risk*** (2008); ***Advanced Analytical Models: 250 Applications from Basel II Accord to Wall Street and Beyond*** (2008); ***Modeling Risk: Applying Monte Carlo Simulation, Real Options, Optimization, and Forecasting*** (2006); ***Real Options Analysis: Tools and Techniques, First and Second Editions*** (2003 and 2005); ***Real Options Analysis Course: Business Cases*** (2003); ***Applied Risk Analysis: Moving Beyond Uncertainty*** (2003); and ***Valuing Employee Stock Options*** (2004). His books and software are being used at top universities around the world. Dr. Mun is also currently a finance and economics professor and has taught courses in financial management, investments, real options, economics, and statistics at the undergraduate and the graduate MBA levels. He teaches and has taught at universities all over the world, from the U.S. Naval Postgraduate School (Monterey, California) and University of Applied Sciences (Switzerland and Germany) as full professor, to Golden Gate University (California) and San Francisco State University (California) as adjunct professor, and has chaired many graduate research MBA thesis and Ph.D. dissertation committees. He was formerly the Vice President of Analytics at Decisioneering, Inc. Before that, he was a Consulting Manager and Financial Economist in the Valuation Services and Global Financial Services practice of KPMG Consulting and a Manager with the Economic Consulting Services practice at KPMG LLP. He has taught and consulted for over 100 multinational firms (former clients include 3M, Airbus, Boeing, BP, Chevron Texaco, Financial Accounting Standards Board, Fujitsu, GE, Microsoft, Motorola, Pfizer, Timken, U.S. Department of Defense, State and Local Governments, Veritas, and many others). His experience prior to joining KPMG included being department head of financial planning and analysis at Viking Inc. of FedEx, performing financial forecasting, economic analysis, and market research.

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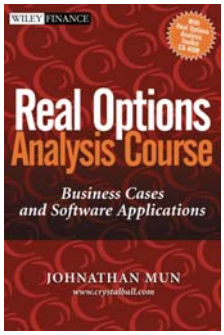

Real Options Analysis Course: Business Cases and Software Applications

Dr. Johnathan Mun
ISBN: 0471430013 (2003)
Hard Cover and Cloth 360 Pages

Available on www.wiley.com *Keyword: JOHNATHAN MUN*

The *Real Options Analysis Course* (Wiley Finance March 2003) is now available on the Amazon web site. The book follows the lecture seminars: "Real Options for Managers" and "Real Options for Analysts" that the author has held worldwide. This is a follow-up to Mun's previous book, *"Real Options Analysis: Tools and Techniques for Valuing Strategic Investments and Decisions."* Read the book written by the same person who created the software and have taught, advised and consulted on the applications of real options at multiple firms worldwide. The book includes a CD-ROM of the Real Options Analysis Toolkit limited edition software, Crystal Ball® Monte Carlo simulation trial software, OptQuest stochastic-optimization software, and a series of Excel worksheet models ranging from chapter problems and cases to forecast simulation and resource optimization models. The book is written with the analyst and finance student in mind. The case studies and step-by-step problems (and associated answers for faculty download) coupled with the theories in the first book provide a comprehensive course in using Real Options in the real world, with the relevant software applications.

PREFACE

This book was written with the corporate financial analyst and finance student in mind. Real Options Course's business cases, exercises, step-by-step methodologies and applications have been adapted for and solved using the enclosed Real Options Analysis Toolkit software (limited edition) CD-ROM. It is assumed that the reader has familiarity with real options concepts as outlined in Mun's previous book, *Real Options Analysis* (Wiley Finance, 2002), as some of the more important concepts overlap between these books. As in the first book, the focus is on the ease of use and pragmatic applications of real options and forgoes many of the theoretical concepts. The idea is to demystify the black-box analytics in real options and to make transparent its concepts, methodologies and applications. Rather than relying on stochastic Ito calculus, variance reduction, numerical methods, differential equations or stochastic path-dependent simulations to solve real options problems, this book instead relies heavily on binomial lattices, which is shown time and again to be reliable and produce identical results, at the limit, to the former approaches. While it is extremely easy to modify binomial lattices depending on the real options or to more accurately mirror the intricacies of actual business cases, it is extremely difficult to do so using the more advanced techniques. In the end, the more flexible and mathematically manageable approach becomes the pragmatic approach. The flexibility in the modeling approach flows well with the overall theme of this book: "If you can think it, you can solve it!"

Finally, the author's intention is to reveal as much as possible in the realms of real options. A black box will remain a black box if no one can understand the concepts despite its power and applicability. It is only when the black box becomes transparent that analysts can understand, apply, and convince others of its results and applicability, that the approach will receive wide-spread influence. It took over two decades for discounted cash flow and net present value analysis to take hold in corporate finance – then again, that was during an era of slide-rules, little knowledge of corporate finance, and virtually no desktop computer software spreadsheet applications. The author is convinced that with the advent of his software, Real Options Analysis Toolkit, books such as this one (that demystifies real options, rather than collude it with academic jargon and unnecessary complexities), seminars and trainings like the ones the author has held worldwide, the learning curve will be traversed even more quickly and real options will be accepted as widely as discounted cash flow modeling within the next few decades.

ABOUT THE AUTHOR

Dr. Johnathan C. Mun is the founder, chairman and CEO of Real Options Valuation, Inc. (ROV), a consulting, training, and software development firm specializing in strategic real options, financial valuation, Monte Carlo simulation, stochastic forecasting, optimization, and advanced analytics located in northern Silicon Valley, California. ROV has partners around the world including Beijing, Chicago, Colombia, Hong Kong, Mexico City, New York, Nigeria, Shanghai, Singapore, Spain, Zurich, and other locations. ROV also has a local office in Shanghai. He is also the chairman of the International Institute of Professional Education and Research (IIPER), an accredited global organization providing the Certified in Risk Management (CRM) designation, among others, staffed by professors from named universities from around the world. He is the creator of multiple software tools including ***Risk Simulator, Real Options SLS, Modeling Toolkit, Basel II Modeler, ROV Modeler, ROV Optimizer, ROV Valuator, ROV Extractor and Evaluator, ROV Compiler, ROV BizStats, ROV Dashboard, Employee Stock Options Valuation*** software and others (some of these tools are showcased in this book), as well as the risk analysis ***Training DVD***. He has authored ten books published by John Wiley & Sons and Elsevier Science, including ***The Banker's Handbook on Credit Risk*** (2008); ***Advanced Analytical Models: 250 Applications from Basel II Accord to Wall Street and Beyond*** (2008); ***Modeling Risk: Applying Monte Carlo Simulation, Real Options, Optimization, and Forecasting*** (2006); ***Real Options Analysis: Tools and Techniques, First and Second Editions*** (2003 and 2005); ***Real Options Analysis Course: Business Cases*** (2003); ***Applied Risk Analysis: Moving Beyond Uncertainty*** (2003); and ***Valuing Employee Stock Options*** (2004). His books and software are being used at top universities around the world. Dr. Mun is also currently a finance and economics professor and has taught courses in financial management, investments, real options, economics, and statistics at the undergraduate and the graduate MBA levels. He teaches and has taught at universities all over the world, from the U.S. Naval Postgraduate School (Monterey, California) and University of Applied Sciences (Switzerland and Germany) as full professor, to Golden Gate University (California) and San Francisco State University (California) as adjunct professor, and has chaired many graduate research MBA thesis and Ph.D. dissertation committees. He was formerly the Vice President of Analytics at Decisioneering, Inc. Before that, he was a Consulting Manager and Financial Economist in the Valuation Services and Global Financial Services practice of KPMG Consulting and a Manager with the Economic Consulting Services practice at KPMG LLP. He has taught and consulted for over 100 multinational firms (former clients include 3M, Airbus, Boeing, BP, Chevron Texaco, Financial Accounting Standards Board, Fujitsu, GE, Microsoft, Motorola, Pfizer, Timken, U.S. Department of Defense, State and Local Governments, Veritas, and many others). His experience prior to joining KPMG included being department head of financial planning and analysis at Viking Inc. of FedEx, performing financial forecasting, economic analysis, and market research.

Dr. Mun received his Ph.D. in Finance and Economics from Lehigh University, where his research and academic interests were in the areas of investment finance, econometric modeling, financial options, corporate finance, and microeconomic theory. He also has an MBA in business administration, an MS in management science, and a BS in Biology and Physics. He is Certified in Financial Risk Management (FRM), Certified in Financial Consulting (CFC), and Certified in Risk Management (CRM). He is a member of the American Mensa, Phi Beta Kappa Honor Society, and Golden Key Honor Society as well as several other professional organizations, including the Eastern and Southern Finance Associations, American Economic Association, and Global Association of Risk Professionals. In addition, he has written many academic articles published in the Journal of the Advances in Quantitative Accounting and Finance, the Global Finance Journal, the International Financial Review, the Journal of Financial Analysis, the Journal of Applied Financial Economics, the Journal of International Financial Markets, Institutions and Money, the Financial Engineering News, and the Journal of the Society of Petroleum Engineers.

PRAISES FOR *REAL OPTIONS ANALYSIS COURSE*

"Finally, someone gets it! Pure theory without application is useless to the general practitioner! Dr. Mun has managed to remove the cloak of mystery from real options. While his first book dives into the theory and mathematics of the real options methodology, this book cuts to the chase and is chock full of real-life examples that the practitioner can use for framing and analyzing real-world problems. Dr. Mun has created what are destined to become *THE* "user's manuals" for anyone attempting to apply the exciting analytics of real options. Whether you need help with theory, application or simply explaining your results to management, Mun has got you covered."

Jaswant Singh Sihra, P.E., M.B.A.
Senior Strategic Planning Advisor, Halliburton Company

"Most of us come to real options from the perspective of our own areas of expertise. Mun's great skill with this book is in making real options analysis understandable, relevant and therefore immediately applicable to the field within which you are working."

Robert Fourt
Partner, Gerald Eve (UK)

"Dr. Mun's latest book is a logical extension of the theory and application presented in *Real Options Analysis*. More specifically, The *Real Options Analysis Course* presents numerous real options examples and provides the reader with step-by-step problem solving techniques. After having read the book, readers will better understand the underlying theory and the opportunities for applying real option theory in corporate decision-making."

Chris D. Treharne, M.B.A., A.S.A., M.C.B.A.
President – Gibraltar Business Appraisals, Inc.

"This text provides an excellent follow up to Dr. Mun's first book, *Real Options Analysis*. The cases in the *Real Options Analysis Course* provide numerous examples of how the use of real options and the Real Options Toolkit Software can assist in the valuation of strategic and managerial flexibility in a variety of arenas, with many practical and useful examples."

Charles T. Hardy, Ph.D., M.B.A.
Chief Financial Officer & Director of Business Development
Panorama Research, Inc.

"Mun provides a very practical step-by-step guide to applying simulations and real option analysis—invaluable to those of us who are no longer satisfied with conventional valuation approaches alone."

Fred Kohli
Head of Portfolio Management
Syngenta Crop Protection Ltd. (Switzerland)

"The book on Real Options Analysis Course is an engaging hands-on reference for corporate financial engineers, and corporate controllers looking for robust state-of-the-art financial methodologies to tie corporate strategy with financial asset management with the objective to create shareholder value. It is highly recommended for strategists interested in the design of global value chain management. It is a must study for former MBAs who have the desire to keep up with new financial analytics."

Prof Thoi Truong
Oregon Graduate Institute of Technology

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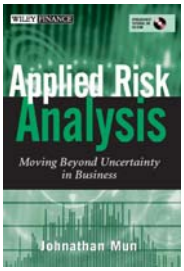

Applied Risk Analysis:
Moving Beyond Uncertainty
Dr. Johnathan Mun

ISBN: 0-471-47885-7 (2003)

Hard Cover and Cloth
460 Pages *Available at* www.amazon.com
Keyword search: JOHNATHAN MUN

Applied Risk Analysis (Wiley Finance 2003), is now available on the Wiley and Amazon web sites. The book includes a CD-ROM with a series of Excel worksheet models ranging from stochastic simulations to resource optimization. The book and software are being adopted by various universities around the world in their MBA programs. In addition, leading industries are in the process of adopting the methodologies outlined in the book and software.

PREFACE

We live in an environment fraught with risk and operate our businesses in a risky world, as higher rewards only come with risks. It is unimaginable if the element of risk is not considered when corporate strategy is framed and when tactical projects are implemented. Applied Risk Analysis provides a novel view of evaluating business decisions, projects, and strategies by taking into consideration a unified strategic portfolio analytical process. The book provides a qualitative and quantitative description of risk, as well as introductions to the methods used in identifying, quantifying, applying, predicting, valuing, hedging, diversifying, and managing risk, through rigorous examples of the methods' applicability in the decision-making process. Pragmatic applications are emphasized in order to demystify the many elements inherent in risk analysis. A black box will remain a black box if no one can understand the concepts despite its power and applicability. It is only when the black box becomes transparent that analysts can understand, apply, and convince others of its results, value-add, and applicability, that the approach will receive wide-spread influence. This is done through step-by-step applications of risk analysis as well as presenting multiple business cases, and discussing real-life applications. This book is targeted at both the uninitiated professional as well as those verbose in risk analysis—there is always something for everyone. It is also applicable for use as a second-year M.B.A. level or introductory Ph.D. textbook. A CD-ROM is included in the book.

ABOUT THE AUTHOR

Dr. Johnathan C. Mun is the founder, chairman and CEO of Real Options Valuation, Inc. (ROV), a consulting, training, and software development firm specializing in strategic real options, financial valuation, Monte Carlo simulation, stochastic forecasting, optimization, and advanced analytics located in northern Silicon Valley, California. ROV has partners around the world including Beijing, Chicago, Colombia, Hong Kong, Mexico City, New York, Nigeria, Shanghai, Singapore, Spain, Zurich, and other locations. ROV also has a local office in Shanghai. He is also the chairman of the International Institute of Professional Education and Research (IIPER), an accredited global organization providing the Certified in Risk Management (CRM) designation, among others, staffed by professors from named universities from around the world. He is the creator of multiple software tools including ***Risk Simulator, Real Options SLS, Modeling Toolkit, Basel II Modeler, ROV Modeler, ROV Optimizer, ROV Valuator, ROV Extractor and Evaluator, ROV Compiler, ROV BizStats, ROV Dashboard, Employee Stock Options Valuation*** software and others (some of these tools are showcased in this book), as well as the risk analysis ***Training DVD***. He has authored ten books published by John Wiley & Sons and Elsevier Science, including ***The Banker's Handbook on Credit Risk*** (2008); ***Advanced Analytical Models: 250 Applications from Basel II Accord to Wall Street and Beyond*** (2008); ***Modeling Risk: Applying Monte Carlo Simulation, Real Options, Optimization, and Forecasting*** (2006); ***Real Options Analysis: Tools and Techniques, First and Second Editions*** (2003 and 2005); ***Real Options Analysis Course: Business Cases*** (2003); ***Applied Risk Analysis: Moving Beyond Uncertainty*** (2003); and ***Valuing Employee Stock Options*** (2004). His books and software are being used at top universities around the world. Dr. Mun is also currently a finance and economics professor and has taught courses in financial management, investments, real options, economics, and statistics at the undergraduate and the graduate MBA levels. He teaches and has taught at universities all over the world, from the U.S. Naval Postgraduate School (Monterey, California) and University of Applied Sciences (Switzerland and Germany) as full professor, to Golden Gate University (California) and San Francisco State University (California) as adjunct professor, and has chaired many graduate research MBA thesis and Ph.D. dissertation committees. He was formerly the Vice President of Analytics at Decisioneering, Inc. Before that, he was a Consulting Manager and Financial Economist in the Valuation Services and Global Financial Services practice of KPMG Consulting and a Manager with the Economic Consulting Services practice at KPMG LLP. He has taught and consulted for over 100 multinational firms (former clients include 3M, Airbus, Boeing, BP, Chevron Texaco, Financial Accounting Standards Board, Fujitsu, GE, Microsoft, Motorola, Pfizer, Timken, U.S. Department of Defense, State and Local Governments, Veritas, and many others). His experience prior to joining KPMG included being department head of financial planning and analysis at Viking Inc. of FedEx, performing financial forecasting, economic analysis, and market research.

Dr. Mun received his Ph.D. in Finance and Economics from Lehigh University, where his research and academic interests were in the areas of investment finance, econometric modeling, financial options, corporate finance, and microeconomic theory. He also has an MBA in business administration, an MS in management science, and a BS in Biology and Physics. He is Certified in Financial Risk Management (FRM), Certified in Financial Consulting (CFC), and Certified in Risk Management (CRM). He is a member of the American Mensa, Phi Beta Kappa Honor Society, and Golden Key Honor Society as well as several other professional organizations, including the Eastern and Southern Finance Associations, American Economic Association, and Global Association of Risk Professionals. In addition, he has written many academic articles published in the Journal of the Advances in Quantitative Accounting and Finance, the Global Finance Journal, the International Financial Review, the Journal of Financial Analysis, the Journal of Applied Financial Economics, the Journal of International Financial Markets, Institutions and Money, the Financial Engineering News, and the Journal of the Society of Petroleum Engineers.

PRAISES FOR *REAL OPTIONS ANALYSIS*

Johnathan Mun's book is a sparkling jewel in my finance library. Mun demonstrates a deep understanding of the underlying mathematical theory in his ability to reduce complex concepts to lucid explanations and examples. For this reason, he's my favorite writer in this field. Experienced professionals will appreciate Mun's competence in boiling down complex math to a clear presentation of the essential solutions to financial risk, corporate finance, and forecasting.
Janet Tavakoli, President, Tavakoli Structured Finance

Every year the market of managerial books is flooded again and again. This book is different. It puts a valuable tool into the hands of corporate managers, who are willing to stand up against uncertainties and risks and are determined to deliver value to shareholder and society even in rough times. It is a book for the new generation of managers, for whom Corporate America is waiting.
Dr. Markus Götz Junginger
Managing Partner, IBCOL Consulting AG (Switzerland)

Dr. Mun breaks through the hyperbole and presents a clear step-by-step approach revealing to readers how quantitative methods and tools can truly make a difference. In short, he teaches you what's relevant and a must know. I highly recommend this book, especially if you want to effectively incorporate the latest technologies into your decision making process for your real world business.
Dr. Paul W. Finnegan, MD, MBA
Vice President, Commercial Operations and Development
Alexion Pharmaceuticals, Inc.

Johnathan Mun has previously published a number of very popular books dealing with different aspects of risk analysis, associated techniques and tools. This last publication puts all the pieces together. The book is really unavoidable for any professional who wants to address risk evaluation following a logical, concrete and conclusive approach.
Jean Louis Vaysse
Deputy Vice President Marketing, Airbus (France)

A must read for product portfolio managers... it captures the risk exposure of strategic investments, and provides management with estimates of potential outcomes and options for risk mitigation.
Rafael E. Gutierrez
Executive Director of Strategic Marketing and Planning, Seagate Technology

Mun has the uncanny ability to clarify the complex, distilling risk analysis concepts into a truly readable and practical guide for decision-makers. This book blazes a trail that connects abstract yet powerful theories with real-world applications and examples, leaving the reader enlightened and empowered.
Stephen Hoye, MBA, President, Hoye Consulting Group

Strategy development has fallen on hard times being judged not relevant for a rapidly changing world. With this book, Dr. Mun attacks this poor excuse head-on by presenting a clearly organized, tool supported, methodology that logically progresses from exploring uncertainty that bounds risk to the creation of options for constructing realistic business strategies.
Robert Mack
Vice President, Distinguished Analyst, Gartner Group

This book is a pleasure to read both for subject matter experts as well as for novices. It holds a high risk of addicting the readers. Dr. Mun leads the readers through step by step complex mathematical concepts with unmatched ease and clarity. Well chosen examples and pointers to pitfalls complement the splendidly written chapters. This book will be a bestseller in Risk Management and is a "must read" for all professionals.
Dr. Hans Weber
Syngenta AG (Switzerland), Product Development Project Leader

Once again, Dr. Johnathan Mun has attained his usual standard: excellence in making not-so-simple but very useful quantitative analytical techniques accessible to the interested reader who doesn't necessarily have an engineering or scientific training. This book presents a seriously comprehensive guide to everyday users of spreadsheet models, particularly those interested in Risk Analysis and Management, on how to move beyond simple statistical analysis. It is a "must have" to academicians searching for user-friendly bibliography, and to practitioners willing to get a first-hand experience on cutting-edge, high-productivity analytical tools.
Dr. Roberto J. Santillan-Salgado
Director of the M.S., EGADE-ITESM, Monterrey Campus (Mexico)

A fundamental principal in finance is the relationship between risk and reward, yet today empirical risk measurement, valuations, and deal structuring are still the norm. Business professionals, venture capitalists and other investors will all find Johnathan Mun's latest book on conceptualizing and quantitatively measuring risk in business of considerable value and a welcome addition to their libraries.
Dr. Charles T. Hardy
Principal, Hardy & Associates

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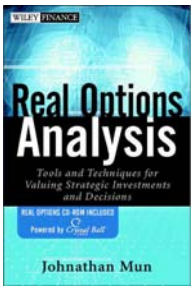

Real Options Analysis:
Tools and Techniques for Valuing Strategic Investments & Decisions

Dr. Johnathan Mun
ISBN: 0-471-25696-X (2002)
Hard Cover and Cloth 416 Pages
Available on www.amazon.com
Keyword search: JOHNATHAN MUN

Real Options Analysis (Wiley Finance), is now available on the Wiley and Amazon web sites. The book follows the lecture seminars: "Real Options for Managers" and "Real Options for Analysts" that the author has held worldwide. A Japanese translation is currently underway and a follow-up book, "*Real Options Analysis: Business Cases and Software Applications"* is forthcoming (February 2003). The book includes a CD-ROM of the Real Options Analysis Toolkit demo software, Crystal Ball® Monte Carlo simulation trial software, OptQuest stochastic-optimization software, and a series of Excel worksheet models ranging from forecast simulation to resource optimization. The book and software are being adopted by the Wharton School's Executive MBA program (University of Pennsylvania), Boston University, Fordham University, and others. In addition, leading industries are in the process of adopting the methodologies outlined in the book and software, including Accenture, Timken, Schlumberger, etc.

PREFACE

Real Options Analysis provides a novel view of evaluating capital investment strategies by taking into consideration the strategic decision-making process. The book provides a qualitative and quantitative description of real options, the methods used in solving real options, why and when they are used, and the applicability of these methods in decision-making. In addition, multiple business cases and real-life applications are discussed. This discussion includes presenting and framing the problems, as well as introducing a stepwise quantitative process developed by the author for solving these problems using the different methodologies inherent in real options. Included are technical presentations of models and approaches used as well as their theoretical and mathematical justifications. The book is divided into two parts. The first part looks at the qualitative nature of real options, providing actual business cases and scenarios of real options in the industry, as well as the high-level explanations of how real options provide the much-needed insights in decision-making. The second part of the book looks at the quantitative analysis, complete with worked-out examples and mathematical formulae. This book is targeted at uninitiated professionals as well as those knowledgeable in real options applications. It is also applicable for use as a second-year M.B.A. level or introductory Ph.D. textbook. A comprehensive CD-ROM is included in the book. The CD-ROM consists of 69 Real Options Models, Crystal Ball® Monte Carlo simulation software, and a series of example options analysis spreadsheets.

ABOUT THE AUTHOR

Dr. Johnathan C. Mun is the founder, chairman and CEO of Real Options Valuation, Inc. (ROV), a consulting, training, and software development firm specializing in strategic real options, financial valuation, Monte Carlo simulation, stochastic forecasting, optimization, and advanced analytics located in northern Silicon Valley, California. ROV has partners around the world including Beijing, Chicago, Colombia, Hong Kong, Mexico City, New York, Nigeria, Shanghai, Singapore, Spain, Zurich, and other locations. ROV also has a local office in Shanghai. He is also the chairman of the International Institute of Professional Education and Research (IIPER), an accredited global organization providing the Certified in Risk Management (CRM) designation, among others, staffed by professors from named universities from around the world. He is the creator of multiple software tools including ***Risk Simulator, Real Options SLS, Modeling Toolkit, Basel II Modeler, ROV Modeler, ROV Optimizer, ROV Valuator, ROV Extractor and Evaluator, ROV Compiler, ROV BizStats, ROV Dashboard, Employee Stock Options Valuation*** software and others (some of these tools are showcased in this book), as well as the risk analysis Training DVD. He has authored ten books published by John Wiley & Sons and Elsevier Science, including ***The Banker's Handbook on Credit Risk*** (2008); ***Advanced Analytical Models: 250 Applications from Basel II Accord to Wall Street and Beyond*** (2008); ***Modeling Risk: Applying Monte Carlo Simulation, Real Options, Optimization, and Forecasting*** (2006); ***Real Options Analysis: Tools and Techniques, First and Second Editions*** (2003 and 2005); ***Real Options Analysis Course: Business Cases*** (2003); ***Applied Risk Analysis: Moving Beyond Uncertainty*** (2003); and ***Valuing Employee Stock Options*** (2004). His books and software are being used at top universities around the world. Dr. Mun is also currently a finance and economics professor and has taught courses in financial management, investments, real options, economics, and statistics at the undergraduate and the graduate MBA levels. He teaches and has taught at universities all over the world, from the U.S. Naval Postgraduate School (Monterey, California) and University of Applied Sciences (Switzerland and Germany) as full professor, to Golden Gate University (California) and San Francisco State University (California) as adjunct professor, and has chaired many graduate research MBA thesis and Ph.D. dissertation committees. He was formerly the Vice President of Analytics at Decisioneering, Inc. Before that, he was a Consulting Manager and Financial Economist in the Valuation Services and Global Financial Services practice of KPMG Consulting and a Manager with the Economic Consulting Services practice at KPMG LLP. He has taught and consulted for over 100 multinational firms (former clients include 3M, Airbus, Boeing, BP, Chevron Texaco, Financial Accounting Standards Board, Fujitsu, GE, Microsoft, Motorola, Pfizer, Timken, U.S. Department of Defense, State and Local Governments, Veritas, and many others). His experience prior to joining KPMG included being department head of financial planning and analysis at Viking Inc. of FedEx, performing financial forecasting, economic analysis, and market research.

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PRAISES FOR *REAL OPTIONS ANALYSIS*

"…this book is a *must have* and *must read…* Dr. Mun's new book is a refreshing, cutting-edge look at a powerful new decision-making process… it isn't often you can truthfully say a book breaks new ground, but [this book] has certainly done that."
-Glenn G. Kautt, President, Monitor Group, Inc. (USA)

"Many books on real options can be intimidating. Dr. Mun offers a pragmatic, reliable and entertaining guide. Complex concepts and formulas are brilliantly interspersed with well chosen examples and step-by-step walk through from a variety of industries."
-Shota Hattori, President and CEO, Kozo Engineering, (Japan)

"Real Options Analysis is the clearest book on real options that we have read to date. It does an excellent job of demystifying a difficult and complex subject. It provides a solid basis for conceiving, assessing and evaluating real option investments, which will make it useful to practitioners and students alike."
-Ian C. MacMillan, Professor
The Wharton School of the University of Pennsylvania (USA)

"…the clarity and comprehensive coverage makes it the best guide for all practitioners… coupled with state-of-the-art financial tools CD-ROM."
-Michael Sim, Partner, Moores Rowland International (Hong Kong)

"Dr. Johnathan Mun certainly has earned the reputation of being an expert on the subject… consultants, analysts, decision-makers and engineers will be all over this book and its software."
-Phyllis Koessler, Managing Director, Koessler and Associates (Switzerland)

"…finally, a real options analysis book that is technically sophisticated enough to be useful, and practically written so that it can actually be used. It is destined to become the handbook of real options."
-Tracy Gomes, CEO, Intellectual Property Economics (USA)

"Dr. Mun demystifies real options analysis and delivers a powerful, pragmatic guide for decision-makers and practitioners alike. Finally, there is a book that equips professionals to easily recognize, value, and seize real options in the world around them."
- Jim Schreckengast, Sr. Vice President, R&D Strategy – Gemplus International SA (France)

"...written from the viewpoint of an educator and a practitioner, his book offers a readable reference full of insightful decision-making tools to satisfy both the novice and the experienced veteran."
-Richard Kish, Ph.D., Associate Professor of Finance, Lehigh University

"Dr. Mun has converted his tacit financial knowledge into a digestible user-friendly book. He effectively leads the reader on a solid path starting from *discounted cash flow,* progressing through *Monte Carlo analysis* and evolving to *real options* to get even closer to the target of achieving confident corporate decisions. His ability to clearly explain the relationships of popular competing analysis methods will make this a must have reference book for today's decision makers."
-Ken English, Director of R&D, The Timken Company (USA)

"The book leads the field in real options analytics and is a must-read for anyone interested in performing such analyses. Dr. Mun has made a formidable subject crystal clear and exponentially easy for senior management to understand. *Monte Carlo simulation* and *real options* software alone is worth the book price many times over."
-Morton Glantz, Renowned educator in finance, author of several books, financial advisor to government (USA)

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	DETAILED COMPETITIVE COMPARISONS	Risk Simulator	Crystal Ball	@Risk
New Software	ROV Risk Simulator	★	★	★
	ROV BizStats	★	None	★
	ROV Compiler	★	None	None
	ROV Modeler, ROV Optimizer, ROV Valuator	★	None	None
	ROV Extractor and Evaluator	★	None	None
	ROV Dashboard	★	None	None
	ROV Web Models	★	None	None
	ROV Modeling Toolkit	★	None	None
	ROV Real Options SLS	★	None	None
	ROV Employee Stock Options Toolkit	★	None	None
Monte Carlo Simulation	24 statistical distributions and one customizable distribution	★	★	★
	Complete integration with Excel (dynamic linking, VBA macros)	★	★	★
	Traditional Monte Carlo Methods	★	★	★
	Correlated simulation with distributional truncation	★	★	★
	Multidimensional simulations with uncertain input parameters	★	★	★
	Super Speed Simulation	★	★	★
	Comprehensive simulation and analytical reports	★	Some	Some
	Advanced Correlation Copula Methods	★	None	None
	Simulation Profiles for scenario analysis in simulation	★	None	None
Forecasting	ARIMA models (time-series and panel)	★	None	None
	Auto-ARIMA models (time-series and panel)	★	None	None
	Auto Econometrics (thousands of models tested)	★	None	None
	Basic Econometric Modeling (time-series and panel)	★	None	None
	Cubic Spline Forecasting (time-series and panel)	★	None	None
	Exponential J and Logistic S Curves (time-series)	★	None	None
	GARCH Volatility Forecasts (time-series)	★	None	None
	Markov Chain Forecasts (time-series)	★	None	None
	Maximum Likelihood Models (cross-sectional)	★	None	None
	Multiple regression analysis (time-series, cross-sectional)	★	★	★
	Nonlinear extrapolation (time-series)	★	None	None
	Stochastic process forecasting (time-series)	★	None	None
	Time-series analysis forecasting (time-series)	★	★	★

Optimization	Optimization with continuous variables	★	★	★
	Optimization with discrete integer variables	★	★	★
	Optimization with mixed continuous and discrete variables	★	★	★
	Linear optimization	★	★	★
	Nonlinear optimization	★	★	★
	Static optimization (fast single-point estimates) and efficient frontier analysis	★	★	★
	Dynamic optimization (simulation with optimization)	★	★	★
	Stochastic optimization (multiple iterations with decision variable distributions)	★	None	None

Analytical Tools	Data Diagnostics (Autocorrelation, Correlation, Distributive Lags, Heteroskedasticity, Micronumerosity, Multicollinearity, Nonlinearity, Nonstationarity, Normality, Outliers, Stochastic Parameter Estimations)	★	None	None
	Data extraction and forecast extraction	★	★	★
	Distribution probability analysis (PDF, CDF, ICDF)	★	None	None
	Distributional fitting of existing data	★	★	★
	Hypothesis testing of distributions	★	None	None
	Nonparametric bootstrap simulation	★	★	★
	Overlay Charts	★	★	★
	Scenario analysis	★	★	★
	Segmentation Clustering	★	None	None
	Sensitivity analysis	★	★	★
	Statistical Analysis (Autocorrelation, Data Fitting, Descriptive Statistics, Hypothesis Tests, Nonlinear Extrapolation, Normality, Stochastic Parameter Estimation, Time-Series Forecasting)	★	None	None
	Tornado and Spider charts	★	★	★

Modeling Toolkit	This modeling toolkit comprises over **800** functions, models and tools as well as over **300** Excel and SLS-based model templates using Risk Simulator, Real Options SLS, Excel, as well as advanced analytical functions in the Modeling Toolkit: ● Credit Analysis ● Debt Analysis ● Decision Analysis ● Forecasting ● Industry Applications ● Option Analysis ● Probability of Default ● Project Management ● Risk Hedge ● Six Sigma and Quality Analysis Tools ● Statistics Tools ● Valuation Model ● Yield Curve	★	None	None

Real Option Super Lattice Solver (SLS)	Abandonment, Contraction, Expansion, and Chooser Options	★	None	None
	American, Bermudan, Customized, and European Options	★	None	None
	Changing Volatility Options	★	None	None
	Example Advanced SLS models	★	None	None
	Exotic Single and Double Barrier Options	★	None	None
	Exotic Options Calculator with over 300+ Models	★	None	None
	Financial Options, Real Options, and Employee Stock Options	★	None	None
	Lattice Maker (Excel add-in)	★	None	None
	Multiple Underlying Asset and Multiple Phased Options	★	None	None
	Simultaneous and Multiple Phased Sequential Compound Options	★	None	None
	Specialized Options (Mean-Reversion, Jump-Diffusion, Rainbow)	★	None	None
	Standalone software with Excel add-in functionality (simulation and optimization compatible functions in Excel)	★	None	None
	Trinomial, quadranomial, pentanomial lattices for mean-reverting and jump-diffusion with dual-asset rainbow options		None	None
	Visible equations and functions Volatility computation models	★	None	None
	Type of Employee Stock Options ● Blackout Period ● Changing Forfeiture Rates ● Changing Risk-free Rates ● Changing Volatilities ● Forfeiture Rates (Pre- and Post-vesting) ● Stock Price Barrier Requirements ● Suboptimal Exercise Behavior Multiple ● Vesting Periods ● ALL OTHER EXOTIC VARIABLES	★	None	None

Consulting Services	Advanced Modeling Services	★	None	None
	Basic Model Building Services	★	★	★
	Employee Stock Options Valuation 2004 FAS 123	★	None	None
	Exotic Financial Instrument Valuation (Warrants, Convertibles, Swaptions, CDO, MBS, and many other customized instruments)	★	None	None
	Insurance and Actuarial Analysis	★	None	None
	Real Options Valuation Services	★	None	None
	Risk Analysis and Strategy Valuation	★	None	None
	Valuation Services	★	None	None

Training Services	Certified in Risk Management (CRM)	★	None	None
	Credit and Market Risk Analysis for Basel II (onsite seminars only)	★	None	None
	Risk Analysis Courses: • Analytical Tools • Basic Real Options (SLS software) • Forecasting (Risk Simulator) • Monte Carlo Simulation (Risk Simulator) • Optimization (Risk Simulator)	★	★	★
	Real Options for Analyst • Advanced real options analytics • Understanding the SLS software • Framing options	★	None	None
	Real Options for Executives • The basics of real options • Making strategic decisions in real options • Framing strategic options • Interpreting options results	★	None	None
	Valuing Employee Stock Options • Applying binomial lattices in the ESO Toolkit software to value employee stock options under the 2004 revised FAS 123	★	None	None
	Customized Seminars • Courses customized to your specific needs	★	★	★

MODELING TOOLKIT

Real Options Valuation, Inc. is proud to present its latest innovation, the **Modeling Toolkit (Premium Edition)**. This toolkit comprises over 800 analytical models, functions and tools, and about 300 analytical model Excel/SLS templates and example spreadsheets covering the areas of risk analysis, simulation, forecasting, Basel II risk analysis, credit and default risk, statistical models, and much more! This toolkit is a set of mathematically sophisticated models written in C++ and linked into Excel spreadsheets. There are over 1100 models, functions, with spreadsheet and SLS templates in this toolkit and the analytical areas covered include:

Analytics

1. Central Limit Theorem
2. Central Limit Theorem (Lottery Analysis)
3. Flaw of Averages
4. Mathematical Integration
5. Parametric and Nonparametric Hypothesis Tests
6. Projectile Motion
7. Regression Diagnostics
8. Ships in the Night
9. Statistical Analysis
10. Weighting of Ratios

Banking Models

11. Audit of Construction Lending
12. Banker's Construction Budget
13. Classified Breakeven Loan
14. Classified Loan Borrowing Base
15. Classified Loan Cash Budget and Overdraft
16. Federal Reserve Camels Rating
17. Firm in Financial Distress
18. Project Finance Risk Rating
19. Queuing Models
20. Reconciling Enron's Cash Flow
21. Risk Rating Model
22. Sample Cash Flows
23. Sensitivity Projections
24. Stochastic Loan Pricing Model
25. Valuation and Appraisal

Credit Analysis

26. Credit Default Swaps/Credit Spread Options
27. Credit Default Swaps Correlated Counterparty Defaults
28. Credit Premium
29. Credit Risk and Price Effects
30. External Debt Rating Spreads
31. Internal Credit Risk Rating
32. Profit-Cost of New Credit

Debt Analysis

33. Asset Equity Parity Model
34. Cox Model on Price and Yield of Risky Debt with Mean Reverting Rates
35. Debt Repayment and Amortization
36. Debt Sensitivity Models
37. Merton Price of Risky Debt Stochastic Asset and Interest
38. Vasicek Debt Option Valuation
39. Vasicek Price/Yield Risky Debt

Decision Analysis

40. Decision Tree Basics
41. Decision Tree, EVPI, Minimax, Bayes Theorem
42. Economic Order Quantity and Inventory Reorder Point
43. Economic Order Quantity and Optimal Manufacturing
44. Expected Utility Analysis
45. Inventory Control
46. Queuing Models

Exotic Options

47. American, Bermudan and European Options
48. Asian Arithmetic
49. Asian Geometric
50. Asset or Nothing
51. Barrier Options
52. Binary Digital Options
53. Cash or Nothing
54. Commodity Options
55. Complex Chooser
56. Credit Spread Options
57. Currency Options
58. Double Barriers
59. Exchange Assets
60. Extreme Spread
61. Foreign Equity Linked Forex
62. Foreign Equity Domestic Currency
63. Foreign Equity Fixed Forex
64. Foreign Takeover Options
65. Forward Start
66. Futures and Forward Options
67. Gap Options
68. Graduated Barriers
69. Index Options
70. Inverse Gamma Out-of-the-money Options
71. Jump Diffusion
72. Leptokurtic and Skewed Options
73. Lookback Fixed Strike Partial Time
74. Lookback Fixed Strike
75. Lookback Floating Strike Partial Time
76. Lookback Floating Strike
77. Min and Max of Two Assets
78. Option Collar
79. Options on Options
80. Perpetual Options
81. Simple Chooser
82. Spread on Futures
83. Supershares
84. Time Switch
85. Trading Day Corrections
86. Two Assets Barrier
87. Two Assets Cash
88. Two Assets Correlated
89. Uneven Dividends
90. Writer Extendible

Forecasting

91. Brownian Motion Stochastic Process
92. Data Diagnostics
93. Econometric, Correlations and Multiple Regression
94. Exponential J-Growth Curves
95. Forecasting Manual Computations
96. Jump-Diffusion Stochastic Process
97. Linear Interpolation
98. Logistic S-Growth Curves
99. Markov Chains and Market Share
100. Mean-Reverting Stochastic Process
101. Multiple Regression
102. Nonlinear Extrapolation
103. Stochastic Processes and Yield Curves
104. Stock Distribution at Horizon
105. Time-Series Analysis
106. Time-Series ARIMA

Industry Applications

107. Asset Liability Management ALM
108. Biotech – Manufacturing Strategy
109. Biotech – In-licensing and Deal Structuring
110. Biotech – Investment Valuation
111. Electric Utility – Efficient Frontier Generation
112. Electric Utility – Electricity Contract Risk
113. Information Technology – Forecasting Use

114. Information Technology – Decision Analysis
115. Pensions – Closed Group Portfolio Matching
116. Pensions – Accounting Modeling and Optimization
117. Real Estate – Commercial ROI

Optimization

118. Capital Investments (Part A)
119. Capital Investments (Part B)
120. Continuous Portfolio Allocation
121. Discrete Project Selection
122. Inventory Optimization
123. Investment Portfolio Allocation
124. Military Portfolio and Efficient Frontier
125. Optimal Pricing with Elasticity
126. Optimization of a Harvest Model
127. Optimizing Ordinary Least Squares
128. Stochastic Portfolio Allocation

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129. Binary Digital Instruments
130. Inverse Floater Bond Lattice Maker
131. Options Adjusted Spreads on Debt
132. Options on Debt
133. Options Trading Strategies

Probability of Default

134. Empirical (Individuals)
135. External Options Model (Public Company)
136. Merton Internal Model (Private Company)
137. Merton Market Options Model (Industry Comparable)
138. Yields and Spreads (Market Comparable)

Project Management

139. Cost Estimation Model
140. Critical Path Analysis (CPM PERT GANTT)
141. Project Timing

Real Options SLS

142. Employee Stock Options - Simple American Call
143. Employee Stock Options - Simple Bermudan Call with Vesting
144. Employee Stock Options - Simple European Call
145. Employee Stock Options - Suboptimal Exercise
146. Employee Stock Options - Vesting and Suboptimal Exercise
147. Employee Stock Options - Vesting, Blackout, Suboptimal, Forfeiture
148. Exotic Options - American Call Option with Dividends
149. Exotic Options - Accruals on Basket of Assets
150. Exotic Options - American Call Option on Foreign Exchange
151. Exotic Options - American Call Option on Index Futures
152. Exotic Options - Barrier Option - Down and In Lower Barrier
153. Exotic Options - Barrier Option - Down and Out Lower Barrier
154. Exotic Options - Barrier Option - Up and In Upper Barrier Call
155. Exotic Options - Barrier Option - Up and In, Down and In Double Barrier Call
156. Exotic Options - Barrier Option - Up and Out Upper Barrier
157. Exotic Options - Barrier Option - Up and Out, Down and Out Double Barrier
158. Exotic Options - Basic American, European, versus Bermudan Call Options
159. Exotic Options - Chooser Option
160. Exotic Options - Equity Linked Notes
161. Exotic Options - European Call Option with Dividends
162. Exotic Options - Range Accruals
163. Options Analysis - Plain Vanilla Call I
164. Options Analysis - Plain Vanilla Call II
165. Options Analysis - Plain Vanilla Call III
166. Options Analysis - Plain Vanilla Call IV
167. Options Analysis - Plain Vanilla Put
168. Real Options - Abandonment American Option
169. Real Options - Abandonment Bermudan Option
170. Real Options - Abandonment Customized Option
171. Real Options - Abandonment European Option
172. Real Options - Contraction American and European Option
173. Real Options - Contraction Bermudan Option
174. Real Options - Contraction Customized Option
175. Real Options - Dual-Asset Rainbow Pentanomial Lattice
176. Real Options – Excel-based Options Models
177. Real Options - Exotic Complex Floating American Chooser
178. Real Options - Exotic Complex Floating European Chooser
179. Real Options - Expand Contract Abandon American and European Option
180. Real Options - Expand Contract Abandon Bermudan Option
181. Real Options - Expand Contract Abandon Customized I
182. Real Options - Expand Contract Abandon Customized II
183. Real Options - Expansion American and European Option
184. Real Options - Expansion Bermudan Option
185. Real Options - Expansion Customized Option
186. Real Options - Jump Diffusion Calls and Puts using Quadranomial Lattices
187. Real Options - Mean Reverting Calls and Puts using Trinomial Lattices
188. Real Options - Multiple Asset Competing Options (3D Binomial)
189. Real Options - Multiple Phased Complex Sequential Compound Option
190. Real Options - Multiple Phased Sequential Compound
191. Real Options - Multiple Phased Simultaneous Compound
192. Real Options - Simple Calls and Puts (Trinomial Lattices)
193. Real Options - Simple Two Phased Sequential Compound
194. Real Options - Simple Two Phased Simultaneous Compound
195. Real Options - Strategic Cases - High-Tech Manufacturing Strategy A
196. Real Options - Strategic Cases - High-Tech Manufacturing Strategy B
197. Real Options - Strategic Cases - High-Tech Manufacturing Strategy C
198. Real Options - Strategic Cases - Oil and Gas - Strategy A
199. Real Options - Strategic Cases - Oil and Gas - Strategy B
200. Real Options - Strategic Cases - R&D Stage-Gate Process A
201. Real Options - Strategic Cases - R&D Stage-Gate Process B
202. Real Options - Strategic Cases - Switching Option Strategy I
203. Real Options - Strategic Cases - Switching Option Strategy II
204. Trinomial Lattices - American Call
205. Trinomial Lattices - American Put
206. Trinomial Lattices - European Call
207. Trinomial Lattices - European Put

208. Trinomial Lattices - Mean Reverting American Call Option
209. Trinomial Lattices - Mean Reverting American Put Option
210. Trinomial Lattices - Mean Reverting European Call Option
211. Trinomial Lattices - Mean Reverting European Put Option
212. Trinomial Lattices - Mean Reverting American Abandonment
213. Trinomial Lattices - Mean Reverting American Contraction
214. Trinomial Lattices - Mean Reverting American Expansion
215. Trinomial Lattices - Mean Reverting American Abandonment, Contraction, Expansion
216. Trinomial Lattices - Mean Reverting Bermudan Abandonment, Contraction, Expansion
217. Trinomial Lattices - Mean Reverting Abandonment, Contraction, Expansion
218. Trinomial Lattices - Mean Reverting European Abandonment, Contraction, Expansion
219. Quadranomial Lattices - Jump Diffusion American Call
220. Quadranomial Lattices - Jump Diffusion American Put
221. Quadranomial Lattices - Jump Diffusion European Call
222. Quadranomial Lattices - Jump Diffusion European Put
223. Pentanomial Lattices - American Rainbow Call Option
224. Pentanomial Lattices - American Rainbow Put Option
225. Pentanomial Lattices - Dual Reverse Strike American Call (3D Binomial)
226. Pentanomial Lattices - Dual Reverse Strike American Put (3D Binomial)
227. Pentanomial Lattices - Dual Strike American Call (3D Binomial)
228. Pentanomial Lattices - Dual Strike American Put (3D Binomial)
229. Pentanomial Lattices - European Rainbow Call Option
230. Pentanomial Lattices - European Rainbow Put Option
231. Pentanomial Lattices - Exchange of Two Assets American Put (3D Binomial)
232. Pentanomial Lattices - Maximum of Two Assets American Call (3D Binomial)
233. Pentanomial Lattices - Maximum of Two Assets American Put (3D Binomial)
234. Pentanomial Lattices - Minimum of Two Assets American Call (3D Binomial)
235. Pentanomial Lattices - Minimum of Two Assets American Put (3D Binomial)
236. Pentanomial Lattices - Portfolio American Call (3D Binomial)
237. Pentanomial Lattices - Portfolio American Put (3D Binomial)
238. Pentanomial Lattices - Spread of Two Assets American Call (3D Binomial)
239. Pentanomial Lattices - Spread of Two Assets American Put (3D Binomial)

Risk Analysis

240. Integrated Risk Analysis
241. Interest Rate Risk
242. Portfolio Risk and Return Profile

Risk Hedging

243. Delta Gamma Hedge
244. Delta Hedge
245. Effects of Fixed versus Floating Rates
246. Foreign Exchange Cash Flow Model
247. Foreign Exchange Exposure Hedging

Sensitivity

248. Greeks
249. Tornado and Sensitivity Charts Linear
250. Tornado and Sensitivity Nonlinear

Simulation

251. Basic Simulation Model
252. Best Surgical Team
253. Correlated Simulation
254. Correlation Effects Model
255. Data Fitting
256. DCF, ROI and Volatility
257. Debt Repayment and Amortization
258. Demand Curve and Elasticity Estimation
259. Infectious Diseases
260. Recruitment Budget (Negative Binomial and Multidimensional Simulation)
261. Retirement Funding with VBA Macros
262. Roulette Wheel
263. Time Value of Money

Six Sigma

264. Confidence Intervals with Hypothesis Testing
265. Control Charts (c, n, p, u, X, XmR, R)
266. Delta Precision
267. Design of Experiments and Combinatorics
268. Hypothesis Testing and Bootstrap Simulation
269. Sample Size Correlation
270. Sample Size DPU
271. Sample Size Mean
272. Sample Size Proportion
273. Sample Size Sigma
274. Statistical Analysis (CDF, PDF, ICDF) Hypothesis Testing
275. Statistical Capability Measures
276. Unit Capability Measures

Valuation

277. APT, BETA and CAPM
278. Buy versus Lease
279. Caps and Floors
280. Convertible Bonds
281. Financial Ratios Analysis
282. Financial Statements Analysis
283. Valuation Model
284. Valuation - Warrant - Combined
285. Valuation - Warrant - Put Only
286. Valuation - Warrant - Warrant

Value at Risk

287. Optimized and Simulated Portfolio VaR
288. Options Delta Portfolio
289. Portfolio Operational and Capital Adequacy
290. Right Tail Capital Requirements
291. Static Covariance Method

Volatility

292. EWMA Volatility Models
293. GARCH Volatility Models
294. Implied Volatility
295. Log Asset Returns Approach
296. Log Cash Flow Returns Approach Probability to Volatility

Yield Curve

297. CIR Model
298. Curve Interpolation BIM
299. Curve Interpolation NS
300. Forward Rates from Spot Rates
301. Spline Interpolation and Extrapolation.xls
302. Term Structure of Volatility
303. US Treasury Risk Free Rate
304. Vasicek Model

List of Functions

Below is a comprehensive list of the functions in Modeling Toolkit that can be accessed either through the analytical DLL libraries or in Excel. Please keep checking back at the website for a more updated list. The software is continually evolving and newer applications and models are constantly added. Finally, the applicable Risk Simulator tools applicable when using the Modeling Toolkit are also listed at the end.

1. B2AEPMarketValueAsset
   Market Value of Asset using the Asset-Equity Parity Model.
2. B2AEPMarketValueDebt
   Market Value of Debt using the Asset-Equity Parity Model.
3. B2AEPRequiredReturnDebt
   Required Return on Risky Debt using the Asset-Equity Parity Model.
4. B2AltDistributionCallOption
   Computes the European Call option for an underlying asset returns distribution with skew and kurtosis, and is not perfectly normal. May return an error for unsolvable inputs.
5. B2AltDistributionPutOption
   Computes the European Put option for an underlying asset returns distribution with skew and kurtosis, and is not perfectly normal. May return an error for unsolvable inputs.
6. B2AnnuityRate
   Returns the percentage equivalent of the required periodic payment on an annuity (e.g., mortgage payments, loan repayment). Returns the percentage of the total principal at initiation.
7. B2AsianCallwithArithmeticAverageRate
   An average rate option is a cash-settled option whose payoff is based on the difference between the arithmetic average value of the underlying during the life of the option and a fixed strike.
8. B2AsianCallwithGeometricAverageRate
   An average rate option is a cash-settled option whose payoff is based on the difference between the geometric average value of the underlying during the life of the option and a fixed strike.
9. B2AsianPutwithArithmeticAverageRate
   An average rate option is a cash-settled option whose payoff is based on the difference between a fixed strike and the arithmetic average value of the underlying during the life of the option.
10. B2AsianPutwithGeometricAverageRate
    An average rate option is a cash-settled option whose payoff is based on the difference between a fixed strike and the geometric average value of the underlying during its life.
11. B2AssetExchangeAmericanOption
    Option holder has the right at up to and including expiration to swap out Asset 2 and receive Asset 1, with predetermined quantities.
12. B2AssetExchangeEuropeanOption
    Option holder has the right at expiration to swap out Asset 2 and receive Asset 1, with predetermined quantities.
13. B2AssetOrNothingCall
    At expiration, if in the money, the option holder receives the stock or asset. For a call option, as long as the stock or asset price exceeds the strike at expiration, the stock is received.
14. B2AssetOrNothingPut
    At expiration, if in the money, the option holder receives the stock or asset. For a put option, stock is received only if the stock or asset value falls below the strike price.
15. B2BarrierDoubleUpInDownInCall
    Valuable or knocked in-the-money only if either barrier (upper or lower) is breached, i.e., asset value is above the upper or below the lower barriers, and the payout is in the form of a call option on the underlying asset.
16. B2BarrierDoubleUpInDownInPut
    Valuable or knocked in-the-money only if either barrier (upper or lower) is breached, i.e., asset value is above the upper or below the lower barriers, and the payout is in the form of a put option on the underlying asset.
17. B2BarrierDoubleUpOutDownOutCall
    Valuable or stays in-the-money only if either barrier (upper or lower barrier) is not breached, and the payout is in the form of a call option on the underlying asset.
18. B2BarrierDoubleUpOutDownOutPut
    Valuable or stays in-the-money only if either barrier (upper or lower barrier) is not breached, and the payout is in the form of a put option on the underlying asset.
19. B2BarrierDownandInCall
    Becomes valuable or knocked in-the-money if the lower barrier is breached, and the payout is the call option on the underlying asset. Sometimes, cash is paid at maturity assuming that the option has not been knocked in.
20. B2BarrierDownandInPut
    Becomes valuable or knocked in-the-money if the lower barrier is breached, and the payout is the put option on the underlying asset. Sometimes, cash is paid at maturity assuming that the option has not been knocked in.
21. B2BarrierDownandOutCall
    Valuable or in-the-money only if the lower barrier is not breached, and the payout is the call option on the underlying asset. Sometimes, cash is paid at maturity assuming that the option has not been knocked out.
22. B2BarrierDownandOutPut
    Valuable or in-the-money only if the lower barrier is not breached, and the payout is the put option on the underlying asset. Sometimes, cash is paid at maturity assuming that the option has not been knocked out.
23. B2BarrierUpandInCall
    Becomes valuable or knocked in-the-money if the upper barrier is breached, and the payout is the call option on the underlying asset. Sometimes, cash is paid at maturity assuming that the option has not been knocked in.
24. B2BarrierUpandInPut
    Becomes valuable or knocked in-the-money if the upper barrier is breached, and the payout is the put option on the underlying asset. Sometimes, cash is paid at maturity assuming that the option has not been knocked in.
25. B2BarrierUpandOutCall
    Valuable or in-the-money only if the upper barrier is not breached, and the payout is the call option on the underlying asset. Sometimes, cash is paid at maturity assuming that the option has not been knocked out.
26. B2BarrierUpandOutPut
    Valuable or in-the-money only if the upper barrier is not breached, and the payout is the put option on the underlying asset. Sometimes, cash is paid at maturity assuming that the option has not been knocked out.
27. B2BDTAmericanCallonDebtLattice
    Computes the American Call option on interest-based

instruments and debt or bonds, and creates the entire pricing lattice.

28. B2BDTAmericanCallonDebtValue
Computes the American Call option value on interest-based instruments and debt or bonds, and returns only one value instead of the entire lattice.
29. B2BDTAmericanPutonDebtLattice
Computes the American Put option on interest-based instruments and debt or bonds, and creates the entire pricing lattice.
30. B2BDTAmericanPutonDebtValue
Computes the American Put option value on interest-based instruments and debt or bonds, and returns only one value instead of the entire lattice.
31. B2BDTCallableDebtPriceLattice
Computes the revised price lattice of a callable debt such that the options adjusted spread can be imputed. Allows for changing interest and interest volatilities over time.
32. B2BDTCallableDebtPriceValue
Computes the present value of a coupon bond/debt that is callable, to see the differences in value from a non-callable debt. The lattice can be computed using the function call: B2BDTCallableDebtPriceLattice.
33. B2BDTCallableSpreadValue
Computes the option adjusted spread, i.e., the additional premium that should be charged on the callable option provision.
34. B2BDTEuropeanCallonDebtLattice
Computes the European Call option on interest-based instruments and debt or bonds, and creates the entire pricing lattice.
35. B2BDTEuropeanCallonDebtValue
Computes the European Call option value on interest-based instruments and debt or bonds, and returns only one value instead of the entire lattice.
36. B2BDTEuropeanPutonDebtLattice
Computes the European Put option on interest-based instruments and debt or bonds, and creates the entire pricing lattice.
37. B2BDTEuropeanPutonDebtValue
Computes the European Put option value on interest-based instruments and debt or bonds, and returns only one value instead of the entire lattice.
38. B2BDTFloatingCouponPriceLattice
Value of the floater bond's lattice (coupon rate is floating and can be directly or inversely related to interest rates; e.g., rates drop, coupon increases, the bond appreciates in price and the yield increases).
39. B2BDTFloatingCouponPriceValue
Value of the floater bond (coupon rate is floating and can be directly or inversely related to interest rates; e.g., rates drop, coupon increases, the bond appreciates in price and the yield increases).
40. B2BDTNoncallableDebtPriceLattice
Computes the pricing lattice of a coupon bond/debt that is not callable, to see the differences in value from a callable debt.
41. B2BDTNoncallableDebtPriceValue
Computes the present value of a coupon bond/debt that is not callable, to see the differences from a callable debt.
42. B2BDTInterestRateLattice
Computes the short rate interest lattice based on a term structure of interest rates and changing interest volatilities, as a means to compute option values.
43. B2BDTNonCallableSpreadValue
Computes the straight spread on a bond that is non-callable in order to compare it with the option provision of an option adjusted spread model.
44. B2BDTZeroPriceLattice
Computes the straight price lattice of zero bonds based on a term structure of interest rates and changing interest volatilities, as a means to compute interest-based option values.
45. B2BDTZeroPriceLattice2
Computes the straight price lattice of zero bonds based on a term structure of interest rates and changing interest volatilities, as a means to compute interest-based option values. Returns the same results as the B2BDTZeroPriceLattice function but requires interest rates and interest volatilities as inputs, rather than the entire interest rate lattice.
46. B2BDTZeroPriceValue
Computes the straight price of zero bonds at time zero, based on a term structure of interest rates and changing interest volatilities, as a means to compute interest-based option values.
47. B2BinaryDownAndInAssetAtExpirationOrNothing
Binary digital instrument receiving the asset at expiration, only if a corresponding asset hits a lower barrier or receives nothing otherwise. DT is monitoring steps: 1/12 monthly, 1/52 weekly, 1/250 daily, 0 continuously
48. B2BinaryDownAndInAssetAtExpirationOrNothingCall
Binary digital call option receiving the asset at expiration if the asset hits a lower barrier or receives nothing otherwise. DT is monitoring steps: 1/12 monthly, 1/52 weekly, 1/250 daily, 0 continuously
49. B2BinaryDownAndInAssetAtExpirationOrNothingPut
Binary digital put option receiving the asset at expiration if the asset hits a lower barrier or receives nothing otherwise. DT is monitoring steps: 1/12 monthly, 1/52 weekly, 1/250 daily, 0 continuously
50. B2BinaryDownAndInAssetAtHitOrNothing
Binary digital instrument receiving the asset when it hits a lower barrier or receives nothing otherwise. DT is monitoring steps: 1/12 monthly, 1/52 weekly, 1/250 daily, 0 continuously
51. B2BinaryDownAndInCashAtExpirationOrNothing
Binary digital instrument receiving a cash amount at expiration, only if a corresponding asset hits a lower barrier or receives nothing otherwise. DT is monitoring steps: 1/12 monthly, 1/52 weekly, 1/250 daily, 0 continuously
52. B2BinaryDownAndInCashAtExpirationOrNothingCall
Binary digital call option receiving the cash at expiration if the asset hits a lower barrier or receives nothing otherwise. DT is monitoring steps: 1/12 monthly, 1/52 weekly, 1/250 daily, 0 continuously
53. B2BinaryDownAndInCashAtExpirationOrNothingPut
Binary digital put option receiving the cash at expiration if the asset hits a lower barrier or receives nothing otherwise. DT is monitoring steps: 1/12 monthly, 1/52 weekly, 1/250 daily, 0 continuously
54. B2BinaryDownAndInCashAtHitOrNothing
Binary digital instrument receiving a cash amount when a corresponding asset hits a lower barrier or receives nothing otherwise. DT is monitoring steps: 1/12 monthly, 1/52 weekly, 1/250 daily, 0 continuously
55. B2BinaryDownAndOutAssetAtExpirationOrNothing
Binary digital instrument receiving the asset at expiration, only if a corresponding asset does not hit a lower barrier or receives nothing otherwise. DT is monitoring steps: 1/12 monthly, 1/52 weekly, 1/250 daily, 0 continuously
56. B2BinaryDownAndOutAssetAtExpirationOrNothingCall
Binary digital call options receiving the asset at expiration, only if a corresponding asset does not hit a lower barrier or receives nothing otherwise. DT is monitoring steps: 1/12 monthly, 1/52 weekly, 1/250 daily, 0 continuously
57. B2BinaryDownAndOutAssetAtExpirationOrNothingPut

Binary digital put options receiving the asset at expiration, only if a corresponding asset does not hit a lower barrier or receives nothing otherwise. DT is monitoring steps: 1/12 monthly, 1/52 weekly, 1/250 daily, 0 continuously

58. B2BinaryDownAndOutCashAtExpirationOrNothing
Binary digital instrument receiving a cash amount at expiration, only if a corresponding asset does not hit a lower barrier or receives nothing otherwise. DT is monitoring steps: 1/12 monthly, 1/52 weekly, 1/250 daily, 0 continuously
59. B2BinaryDownAndOutCashAtExpirationOrNothingCall
Binary digital call option receiving a cash amount at expiration, only if a corresponding asset does not hit a lower barrier or receives nothing otherwise. DT is monitoring steps: 1/12 monthly, 1/52 weekly, 1/250 daily, 0 continuously
60. B2BinaryDownAndOutCashAtExpirationOrNothingPut
Binary digital put option receiving a cash amount at expiration, only if a corresponding asset does not hit a lower barrier or receives nothing otherwise. DT is monitoring steps: 1/12 monthly, 1/52 weekly, 1/250 daily, 0 continuously
61. B2BinaryUpAndInAssetAtExpirationOrNothing
Binary digital instrument receiving the asset at expiration, only if a corresponding asset hits an upper barrier or receives nothing otherwise. DT is monitoring steps: 1/12 monthly, 1/52 weekly, 1/250 daily, 0 continuously
62. B2BinaryUpAndInAssetAtExpirationOrNothingCall
Binary digital call option receiving the asset at expiration if the asset hits an upper barrier or receives nothing otherwise. DT is monitoring steps: 1/12 monthly, 1/52 weekly, 1/250 daily, 0 continuously
63. B2BinaryUpAndInAssetAtExpirationOrNothingPut
Binary digital put option receiving the asset at expiration if the asset hits an upper barrier or receives nothing otherwise. DT is monitoring steps: 1/12 monthly, 1/52 weekly, 1/250 daily, 0 continuously
64. B2BinaryUpAndInAssetAtHitOrNothing
Binary digital instrument receiving the asset when it hits an upper barrier or receives nothing otherwise. DT is monitoring steps: 1/12 monthly, 1/52 weekly, 1/250 daily, 0 continuously
65. B2BinaryUpAndInCashAtExpirationOrNothing
Binary digital instrument receiving a cash amount at expiration, only if a corresponding asset hits an upper barrier or receives nothing otherwise. DT is monitoring steps: 1/12 monthly, 1/52 weekly, 1/250 daily, 0 continuously
66. B2BinaryUpAndInCashAtExpirationOrNothingCall
Binary digital call option receiving the cash at expiration if the asset hits an upper barrier or receives nothing otherwise. DT is monitoring steps: 1/12 monthly, 1/52 weekly, 1/250 daily, 0 continuously
67. B2BinaryUpAndInCashAtExpirationOrNothingPut
Binary digital put option receiving the cash at expiration if the asset hits an upper barrier or receives nothing otherwise. DT is monitoring steps: 1/12 monthly, 1/52 weekly, 1/250 daily, 0 continuously
68. B2BinaryUpAndInCashAtHitOrNothing
Binary digital instrument receiving a cash amount when a corresponding asset hits an upper barrier or receives nothing otherwise. DT is monitoring steps: 1/12 monthly, 1/52 weekly, 1/250 daily, 0 continuously
69. B2BinaryUpAndOutAssetAtExpirationOrNothing
Binary digital instrument receiving the asset at expiration, only if a corresponding asset does not hit an upper barrier or receives nothing otherwise. DT is monitoring steps: 1/12 monthly, 1/52 weekly, 1/250 daily, 0 continuously
70. B2BinaryUpAndOutAssetAtExpirationOrNothingCall
Binary digital call options receiving the asset at expiration, only if a corresponding asset does not hit an upper barrier or receives nothing otherwise. DT is monitoring steps: 1/12 monthly, 1/52 weekly, 1/250 daily, 0 continuously
71. B2BinaryUpAndOutAssetAtExpirationOrNothingPut
Binary digital put options receiving the asset at expiration, only if a corresponding asset does not hit an upper barrier or receives nothing otherwise. DT is monitoring steps: 1/12 monthly, 1/52 weekly, 1/250 daily, 0 continuously
72. B2BinaryUpAndOutCashAtExpirationOrNothing
Binary digital instrument receiving a cash amount at expiration, only if a corresponding asset does not hit an upper barrier or receives nothing otherwise. DT is monitoring steps: 1/12 monthly, 1/52 weekly, 1/250 daily, 0 continuously
73. B2BinaryUpAndOutCashAtExpirationOrNothingCall
Binary digital call option receiving a cash amount at expiration, only if a corresponding asset does not hit an upper barrier or receives nothing otherwise. DT is monitoring steps: 1/12 monthly, 1/52 weekly, 1/250 daily, 0 continuously
74. B2BinaryUpAndOutCashAtExpirationOrNothingPut
Binary digital put option receiving a cash amount at expiration, only if a corresponding asset does not hit an upper barrier or receives nothing otherwise. DT is monitoring steps: 1/12 monthly, 1/52 weekly, 1/250 daily, 0 continuously.
75. B2Binomial3DAmericanDualStrikeCallOption
Returns the American option with the payoff [Max(Q2S2-X2,Q1S1-X1)] and valued using a 3D binomial lattice model.
76. B2Binomial3DAmericanDualStrikePutOption
Returns the American option with the payoff [Max(X2-Q2S2,X1-Q1S1)] and valued using a 3D binomial lattice model.
77. B2Binomial3DEuropeanDualStrikeCallOption
Returns the European option with the payoff [Max(Q2S2-X2,Q1S1-X1)] and valued using a 3D binomial lattice model.
78. B2Binomial3DEuropeanDualStrikePutOption
Returns the European option with the payoff [Max(X2-Q2S2,X1-Q1S1)] and valued using a 3D binomial lattice model.
79. B2Binomial3DAmericanExchangeOption
Returns the American and European call and put option (same values exist for all types) with the payoff [Q2S2-Q1S1] and valued using a 3D binomial lattice model.
80. B2Binomial3DAmericanMaximumTwoAssetsCallOption
Returns the American option with the payoff [Max(Q2S2,Q1S1)-X] and valued using a 3D binomial lattice model.
81. B2Binomial3DAmericanMaximumTwoAssetsPutOption
Returns the American option with the payoff [X-Max(Q2S2,Q1S1)] and valued using a 3D binomial lattice model.
82. B2Binomial3DEuropeanMaximumTwoAssetsCallOption
Returns the European option with the payoff [Max(Q2S2,Q1S1)-X] and valued using a 3D binomial lattice model.
83. B2Binomial3DEuropeanMaximumTwoAssetsPutOption
Returns the European option with the payoff [X-Max(Q2S2,Q1S1)] and valued using a 3D binomial lattice model.
84. B2Binomial3DAmericanMinimumTwoAssetsCallOption
Returns the American option with the payoff [Min(Q2S2,Q1S1)-X] and valued using a 3D binomial lattice model.
85. B2Binomial3DAmericanMinimumTwoAssetsPutOption
Returns the American option with the payoff [X-Min(Q2S2,Q1S1)] and valued using a 3D binomial lattice model.
86. B2Binomial3DEuropeanMinimumTwoAssetsCallOption
Returns the European option with the payoff [Min(Q2S2,Q1S1)-X] and valued using a 3D binomial lattice model.
87. B2Binomial3DEuropeanMinimumTwoAssetsPutOption
Returns the European option with the payoff [X-

Min(Q2S2,Q1S1)] and valued using a 3D binomial lattice model.

88. B2Binomial3DAmericanPortfolioCallOption
Returns the American option with the payoff [Q2S2+Q1S1-X] and valued using a 3D binomial lattice model.
89. B2Binomial3DAmericanPortfolioPutOption
Returns the American option with the payoff [X-Q2S2+Q1S1] and valued using a 3D binomial lattice model.
90. B2Binomial3DEuropeanPortfolioCallOption
Returns the European option with the payoff [Q2S2+Q1S1-X] and valued using a 3D binomial lattice model.
91. B2Binomial3DEuropeanPortfolioPutOption
Returns the European option with the payoff [X-Q2S2+Q1S1] and valued using a 3D binomial lattice model.
92. B2Binomial3DAmericanReverseDualStrikeCallOption
Returns the American option with the payoff [Max(X2-Q2S2,Q1S1-X1)] and valued using a 3D binomial lattice model.
93. B2Binomial3DAmericanReverseDualStrikePutOption
Returns the American option with the payoff [Max(Q2S2-X2,X1-Q1S1)] and valued using a 3D binomial lattice model.
94. B2Binomial3DEuropeanReverseDualStrikeCallOption
Returns the European option with the payoff [Max(X2-Q2S2,Q1S1-X1)] and valued using a 3D binomial lattice model.
95. B2Binomial3DEuropeanReverseDualStrikePutOption
Returns the American option with the payoff [Max(Q2S2-X2,X1-Q1S1)] and valued using a 3D binomial lattice model.
96. B2Binomial3DAmericanSpreadCallOption
Returns the American option with the payoff [Q1S1-Q2S2-X] and valued using a 3D binomial lattice model.
97. B2Binomial3DAmericanSpreadPutOption
Returns the American option with the payoff [X+Q2S2-Q1S1] and valued using a 3D binomial lattice model.
98. B2Binomial3DEuropeanSpreadCallOption
Returns the European option with the payoff [Q1S1-Q2S2-X] and valued using a 3D binomial lattice model.
99. B2Binomial3DEuropeanSpreadPutOption
Returns the European option with the payoff [X+Q2S2-Q1S1] and valued using a 3D binomial lattice model.
100. B2BinomialAdjustedBarrierSteps
Computes the correct binomial lattice steps to use for convergence and barrier matching when running a barrier option.
101. B2BinomialAmericanCall
Returns the American call option with a continuous dividend yield using a binomial lattice, where the option can be exercised at any time up to and including maturity.
102. B2BinomialAmericanPut
Returns the American put option with a continuous dividend yield using a binomial lattice, where the option can be exercised at any time up to and including maturity.
103. B2BinomialBermudanCall
Returns the American call option with a continuous dividend yield using a binomial lattice, where the option can be exercised at any time up to and including maturity except during the vesting period.
104. B2BinomialBermudanPut
Returns the American put option with a continuous dividend yield using a binomial lattice, where the option can be exercised at any time up to and including maturity except during the vesting period.
105. B2BinomialEuropeanCall
Returns the European call option with a continuous dividend yield using a binomial lattice, where the option can be exercised only at maturity.
106. B2BinomialEuropeanPut
Returns the European put option with a continuous dividend yield using a binomial lattice, where the option can be exercised only at maturity.
107. B2BlackCallOptionModel
Returns the Black model (modified Black-Scholes-Merton) for forward contracts and interest-based call options.
108. B2BlackPutOptionModel
Returns the Black model (modified Black-Scholes-Merton) for forward contracts and interest-based put options.
109. B2BlackFuturesCallOption
Computes the value of commodities futures call option given the value of the futures contract.
110. B2BlackFuturesPutOption
Computes the value of commodities futures put option given the value of the futures contract.
111. B2BlackScholesCall
European Call Option using Black-Scholes-Merton Model.
112. B2BlackScholesProbabilityAbove
Computes the expected probability the stock price will rise above the strike price under a Black-Scholes paradigm.
113. B2BlackScholesPut
European Put Option using Black-Scholes-Merton Model.
114. B2BondCIRBondDiscountFactor
Returns the discount factor on a bond or risky debt using the Cox-Ingersoll-Ross model, accounting for mean-reverting interest rates.
115. B2BondCIRBondPrice
Cox-Ross model on Zero Coupon Bond Pricing assuming no arbitrage and mean-reverting interest rates.
116. B2BondCIRBondYield
Cox-Ross model on Zero Coupon Bond Yield assuming no arbitrage and mean-reverting interest rates.
117. B2BondConvexityContinuous
Returns the debt's Convexity of second order sensitivity using a series of cash flows and current interest rate, with continuous discounting.
118. B2BondConvexityDiscrete
Returns the debt's Convexity of second order sensitivity using a series of cash flows and current interest rate, with discrete discounting.
119. B2BondConvexityYTMContinuous
Returns debt's Convexity or second order sensitivity using an internal Yield to Maturity of the cash flows, with continuous discounting.
120. B2BondConvexityYTMDiscrete
Returns debt's Convexity or second order sensitivity using an internal Yield to Maturity of the cash flows, with discrete discounting.
121. B2BondDurationContinuous
Returns the debt's first order sensitivity Duration measure using continuous discounting.
122. B2BondDurationDiscrete
Returns the debt's first order sensitivity Duration measure using discrete discounting.
123. B2BondHullWhiteBondCallOption
Values a European call option on a bond where the interest rates are stochastic and mean-reverting. Make sure Bond Maturity > Option Maturity.
124. B2BondHullWhiteBondPutOption
Values a European put option on a bond where the interest rates are stochastic and mean-reverting. Make sure Bond Maturity > Option Maturity.
125. B2BondMacaulayDuration
Returns the debt's first order sensitivity Macaulay's Duration measure.
126. B2BondMertonBondPrice
Bond Price using Merton Stochastic Interest and Stochastic Asset Model.
127. B2BondModifiedDuration

Returns the debt's first order sensitivity Modified Duration measure.

128. B2BondPriceContinuous
Returns the Bond Price of a cash flow series given the time and discount rate, using Continuous discounting.

129. B2BondPriceDiscrete
Returns the Bond Price of a cash flow series given the time and discount rate, using discrete discounting.

130. B2BondVasicekBondCallOption
Values a European call option on a bond where the interest rates are stochastic and mean-reverting to a long-term rate. Make sure Bond Maturity > Option Maturity.

131. B2BondVasicekBondPrice
Vasicek Zero Coupon Price assuming no arbitrage and mean-reverting interest rates.

132. B2BondVasicekBondPutOption
Values a European put option on a bond where the interest rates are stochastic and mean-reverting to a long-term rate. Make sure Bond Maturity > Option Maturity.

133. B2BondVasicekBondYield
Vasicek Zero Coupon Yield assuming no arbitrage and mean-reverting interest rates.

134. B2BondYTMContinuous
Returns Bond's Yield to Maturity assuming Continuous discounting.

135. B2BondYTMDiscrete
Returns Bond's Yield to Maturity assuming discrete discounting.

136. B2CallDelta
Returns the option valuation sensitivity Delta (a call option value's sensitivity to changes in the asset value).

137. B2CallGamma
Returns the option valuation sensitivity Gamma (a call option value's sensitivity to changes in the delta value).

138. B2CallOptionOnTheMax
The maximum values at expiration of both assets are used in option exercise, where the call option payoff at expiration is the maximum price between Asset 1 and Asset 2 against the strike price.

139. B2CallOptionOnTheMin
The minimum values at expiration of both assets are used in option exercise, where the call option payoff at expiration is the minimum price between Asset 1 and Asset 2 against the strike price.

140. B2CallRho
Returns the option valuation sensitivity Rho (a call option value's sensitivity to changes in the interest rate).

141. B2CallTheta
Returns the option valuation sensitivity Theta (a call option value's sensitivity to changes in the maturity).

142. B2CallVega
Returns the option valuation sensitivity Vega (a call option value's sensitivity to changes in the volatility).

143. B2CashOrNothingCall
At expiration, if the option is in the money, the option holder receives a predetermined cash payment. For a call option, as long as the stock or asset price exceeds the strike at expiration, cash is received.

144. B2CashOrNothingPut
At expiration, if the option is in the money, the option holder receives a predetermined cash payment. For a put option, cash is received only if the stock or asset value falls below the strike price.

145. B2ChooserBasicOption
Holder chooses if the option is a call or a put by the chooser time, with the same strike price and maturity. Typically cheaper than buying a call and a put together while providing the same level of hedge.

146. B2ChooserComplexOption
Holder gets to choose if the option is a call or a put within the Chooser Time, with different strike prices and maturities. Typically cheaper than buying a call and a put, while providing the same level of hedge.

147. B2ClosedFormAmericanCall
Returns the American option approximation model with a continuous dividend yield call option.

148. B2ClosedFormAmericanPut
Returns the American option approximation model with a continuous dividend yield put option.

149. B2CoefficientofVariationPopulation
Computes the population coefficient of variation (standard deviation of the sample divided by the mean), to obtain a relative measure of risk and dispersion

150. B2CoefficientofVariationSample
Computes the sample coefficient of variation (standard deviation of the sample divided by the mean), to obtain a relative measure of risk and dispersion

151. B2CommodityCallOptionModel
Computes the value of a commodity-based call option based on spot and futures market, and accounting for volatility of the forward rate.

152. B2CommodityPutOptionModel
Computes the value of a commodity-based put option based on spot and futures market, and accounting for volatility of the forward rate.

153. B2CompoundOptionsCallonCall
A compound option allowing the holder to buy (call) a call option with some maturity, in the future within the option maturity period, for a specified strike price on the option.

154. B2CompoundOptionsCallonPut
A compound option allowing the holder to buy (call) a put option with some maturity, in the future within the option maturity period, for a specified strike price on the option.

155. B2CompoundOptionsPutonCall
A compound option allowing the holder to sell (put) a call option with some maturity, in the future within the option maturity period, for a specified strike price on the option.

156. B2CompoundOptionsPutonPut
A compound option allowing the holder to sell (put) a call option with some maturity, in the future within the option maturity period, for a specified strike price on the option.

157. B2ConvenienceYield
The convenience yield is simply the rate differential between a non-arbitrage futures and spot price and a real-life fair market value of the futures price.

158. B2ConvertibleBondAmerican
Computes the value of a convertible bond using binomial lattices, and accounting for the stock's volatility and dividend yield, as well as the bond's credit spread above risk-free.

159. B2ConvertibleBondEuropean
Computes the value of a convertible bond using binomial lattices, and accounting for the stock's volatility and dividend yield, as well as the bond's credit spread above risk-free.

160. B2CreditAcceptanceCost
Computes the risk-adjusted cost of accepting a new credit line with a probability of default.

161. B2CreditAssetSpreadCallOption
Provides protection from an increase in spread but ceases to exist if the underlying asset defaults and is based on the price of the asset.

162. B2CreditAssetSpreadPutOption
Provides protection from an decrease in spread but ceases to exist if the underlying asset defaults and is based on the price of the asset.

163. B2CreditDefaultSwapSpread
Returns the valuation of a credit default swap CDS spread,

allowing the holder to sell a bond/debt at par value when a credit event occurs.

164. B2CreditDefaultSwapCorrelatedBondandSwapPrice
Computes the valuation of a bond with a credit default swap where both parties are correlated and each has a probability of default and possible recovery rates. At default, the holder receives the notional principal or par value of the bond.

165. B2CreditDefaultSwapCorrelatedBondPrice
Computes the valuation of a bond without any credit default swap where the bond or debt has a probability of default and possible recovery rate.

166. B2CreditDefaultSwapCorrelatedSwapPrice
Computes the price of a credit default swap where both parties are correlated and each has a probability of default and possible recovery rates. At default, the holder receives the notional principal or par value of the bond.

167. B2CreditRatingWidth
Computes the credit ratings width to generate the credit ratings table.

168. B2CreditRejectionCost
Computes the risk-adjusted cost of rejecting a new credit line with a probability of default.

169. B2CreditRiskShortfall
Returns the Credit Risk Shortfall given probability of default and recovery rates.

170. B2CreditSpreadCallOption
Provides protection from an increase in spread but ceases to exist if the underlying asset defaults. Only credit default swaps can cover default events (CSOs are sometimes combined with CDSs).

171. B2CreditSpreadPutOption
Provides protection from an decrease in spread but ceases to exist if the underlying asset defaults. Only credit default swaps can cover default events (CSOs are sometimes combined with CDSs).

172. B2CubicSpline
Interpolates and extrapolates the unknown Y values (based on the required X value) given some series of known X and Y values, and can be used to interpolate inside the data sample or extrapolate outside the known sample.

173. B2CurrencyCallOption
Option to exchange foreign currency into domestic currency by buying domestic currency (selling foreign currency) at a set exchange rate on a specified date. Exchange rate is foreign currency to domestic currency.

174. B2CurrencyForwardCallOption
Computes the value of a currency forward call option.

175. B2CurrencyForwardPutOption
Computes the value of a currency forward put option.

176. B2CurrencyPutOption
Option to exchange domestic currency into foreign currency by selling domestic currency (buying foreign currency) at a set exchange rate on a specified date. Exchange rate is foreign currency to domestic currency.

177. B2DeltaGammaHedgeCallBought
Computes the total amount of call values that has to be bought to perform a Delta-Gamma neutral hedge. Returns a negative value indicating cash outflow.

178. B2DeltaGammaHedgeCallSold
Computes the single unit of call value that has to be sold to perform a Delta-Gamma neutral hedge. Returns a positive value indicating cash inflow.

179. B2DeltaGammaHedgeMoneyBorrowed
Computes the amount of money that has to be borrowed to perform a Delta-Gamma neutral hedge. Returns a positive value indicating cash inflow.

180. B2DeltaGammaHedgeSharesBought
Computes the total value of stocks that has to be bought to perform a Delta-Gamma neutral hedge. Returns a negative value indicating cash outflow.

181. B2DeltaHedgeCallSold
Computes the single unit of call value that has to be sold to perform a Delta-neutral hedge. Returns a positive value indicating cash inflow.

182. B2DeltaHedgeMoneyBorrowed
Computes the amount of money that has to be borrowed to perform a Delta-neutral hedge. Returns a positive value indicating cash inflow.

183. B2DeltaHedgeSharesBought
Computes the total value of stocks that has to be bought to perform a Delta-neutral hedge. Returns a negative value indicating cash outflow.

184. B2DistributionBernoulliKurtosis
Returns the Bernoulli distribution's theoretical excess kurtosis (fourth moment), measuring the peakedness of the distribution and its extreme tail events. An excess kurtosis of 0 implies a normal tail.

185. B2DistributionBernoulliMean
Returns the Bernoulli distribution's theoretical mean or expected value (first moment), measuring the central tendency of the distribution.

186. B2DistributionBernoulliSkew
Returns the Bernoulli distribution's theoretical skew (third moment), measuring the direction of the distribution's tail. Positive (negative) skew means mean exceeds (is less than) median and the tail points to the right (left).

187. B2DistributionBernoulliStdev
Returns the Bernoulli distribution's theoretical standard deviation (second moment), measuring the width and average dispersion of all points around the mean.

188. B2DistributionBetaKurtosis
Returns the Beta distribution's theoretical excess kurtosis (fourth moment), measuring the peakedness of the distribution and its extreme tail events. An excess kurtosis of 0 implies a normal tail.

189. B2DistributionBetaMean
Returns the Beta distribution's theoretical mean or expected value (first moment), measuring the central tendency of the distribution.

190. B2DistributionBetaSkew
Returns the Beta distribution's theoretical skew (third moment), measuring the direction of the distribution's tail. Positive (negative) skew means mean exceeds (is less than) median and the tail points to the right (left).

191. B2DistributionBetaStdev
Returns the Beta distribution's theoretical standard deviation (second moment), measuring the width and average dispersion of all points around the mean.

192. B2DistributionBinomialKurtosis
Returns the Binomial distribution's theoretical excess kurtosis (fourth moment), measuring the peakedness of the distribution and its extreme tail events. An excess kurtosis of 0 implies a normal tail.

193. B2DistributionBinomialMean
Returns the Binomial distribution's theoretical mean or expected value (first moment), measuring the central tendency of the distribution.

194. B2DistributionBinomialSkew
Returns the Binomial distribution's theoretical skew (third moment), measuring the direction of the distribution's tail. Positive (negative) skew means mean exceeds (is less than) median and the tail points to the right (left).

195. B2DistributionBinomialStdev
Returns the Binomial distribution's theoretical standard deviation (second moment), measuring the width and average dispersion of all points around the mean.

196. B2DistributionCauchyKurtosis
Returns the Cauchy distribution's theoretical excess kurtosis (fourth moment), measuring the peakedness of the distribution and its extreme tail events. An excess kurtosis of 0 implies a normal tail.

197. B2DistributionCauchyMean
Returns the Cauchy distribution's theoretical mean or expected value (first moment), measuring the central tendency of the distribution.

198. B2DistributionCauchySkew
Returns the Cauchy distribution's theoretical skew (third moment), measuring the direction of the distribution's tail. Positive (negative) skew means mean exceeds (is less than) median and the tail points to the right (left).

199. B2DistributionCauchyStdev
Returns the Cauchy distribution's theoretical standard deviation (second moment), measuring the width and average dispersion of all points around the mean.

200. B2DistributionChiSquareKurtosis
Returns the Chi-Square distribution's theoretical excess kurtosis (fourth moment), measuring the peakedness of the distribution and its extreme tail events. An excess kurtosis of 0 implies a normal tail.

201. B2DistributionChiSquareMean
Returns the Chi-Square distribution's theoretical mean or expected value (first moment), measuring the central tendency of the distribution.

202. B2DistributionChiSquareSkew
Returns the Chi-Square distribution's theoretical skew (third moment), measuring the direction of the distribution's tail. Positive (negative) skew means mean exceeds (is less than) median and the tail points to the right (left).

203. B2DistributionChiSquareStdev
Returns the Chi-Square distribution's theoretical standard deviation (second moment), measuring the width and average dispersion of all points around the mean.

204. B2DistributionDiscreteUniformKurtosis
Returns the Discrete Uniform distribution's theoretical excess kurtosis (fourth moment), measuring the peakedness of the distribution and its extreme tail events. An excess kurtosis of 0 implies a normal tail.

205. B2DistributionDiscreteUniformMean
Returns the Discrete Uniform distribution's theoretical mean or expected value (first moment), measuring the central tendency of the distribution.

206. B2DistributionDiscreteUniformSkew
Returns the Discrete Uniform distribution's theoretical skew (third moment), measuring the direction of the distribution's tail. Positive (negative) skew means mean exceeds (is less than) median and the tail points to the right (left).

207. B2DistributionDiscreteUniformStdev
Returns the Discrete Uniform distribution's theoretical standard deviation (second moment), measuring the width and average dispersion of all points around the mean.

208. B2DistributionExponentialKurtosis
Returns the Exponential distribution's theoretical excess kurtosis (fourth moment), measuring the peakedness of the distribution and its extreme tail events. An excess kurtosis of 0 implies a normal tail.

209. B2DistributionExponentialMean
Returns the Exponential distribution's theoretical mean or expected value (first moment), measuring the central tendency of the distribution.

210. B2DistributionExponentialSkew
Returns the Exponential distribution's theoretical skew (third moment), measuring the direction of the distribution's tail. Positive (negative) skew means mean exceeds (is less than) median and the tail points to the right (left).

211. B2DistributionExponentialStdev
Returns the Exponential distribution's theoretical standard deviation (second moment), measuring the width and average dispersion of all points around the mean.

212. B2DistributionFKurtosis
Returns the F distribution's theoretical excess kurtosis (fourth moment), measuring the peakedness of the distribution and its extreme tail events. An excess kurtosis of 0 implies a normal tail.

213. B2DistributionFMean
Returns the F distribution's theoretical mean or expected value (first moment), measuring the central tendency of the distribution.

214. B2DistributionFSkew
Returns the F distribution's theoretical skew (third moment), measuring the direction of the distribution's tail. Positive (negative) skew means mean exceeds (is less than) median and the tail points to the right (left).

215. B2DistributionFStdev
Returns the F distribution's theoretical standard deviation (second moment), measuring the width and average dispersion of all points around the mean.

216. B2DistributionGammaKurtosis
Returns the Gamma distribution's theoretical excess kurtosis (fourth moment), measuring the peakedness of the distribution and its extreme tail events. An excess kurtosis of 0 implies a normal tail.

217. B2DistributionGammaMean
Returns the Gamma distribution's theoretical mean or expected value (first moment), measuring the central tendency of the distribution.

218. B2DistributionGammaSkew
Returns the Gamma distribution's theoretical skew (third moment), measuring the direction of the distribution's tail. Positive (negative) skew means mean exceeds (is less than) median and the tail points to the right (left).

219. B2DistributionGammaStdev
Returns the Gamma distribution's theoretical standard deviation (second moment), measuring the width and average dispersion of all points around the mean.

220. B2DistributionGeometricKurtosis
Returns the Geometric distribution's theoretical excess kurtosis (fourth moment), measuring the peakedness of the distribution and its extreme tail events. An excess kurtosis of 0 implies a normal tail.

221. B2DistributionGeometricMean
Returns the Geometric distribution's theoretical mean or expected value (first moment), measuring the central tendency of the distribution.

222. B2DistributionGeometricSkew
Returns the Geometric distribution's theoretical skew (third moment), measuring the direction of the distribution's tail. Positive (negative) skew means mean exceeds (is less than) median and the tail points to the right (left).

223. B2DistributionGeometricStdev
Returns the Geometric distribution's theoretical standard deviation (second moment), measuring the width and average dispersion of all points around the mean.

224. B2DistributionGumbelMaxKurtosis
Returns the Gumbel Max distribution's theoretical excess kurtosis (fourth moment), measuring the peakedness of the distribution and its extreme tail events. An excess kurtosis of 0 implies a normal tail.

225. B2DistributionGumbelMaxMean
Returns the Gumbel Max distribution's theoretical mean or expected value (first moment), measuring the central tendency of the distribution.

226. B2DistributionGumbelMaxSkew

Returns the Gumbel Max distribution's theoretical skew (third moment), measuring the direction of the distribution's tail. Positive (negative) skew means mean exceeds (is less than) median and the tail points to the right (left).

227. B2DistributionGumbelMaxStdev
Returns the Gumbel Max distribution's theoretical standard deviation (second moment), measuring the width and average dispersion of all points around the mean.

228. B2DistributionGumbelMinKurtosis
Returns the Gumbel Min distribution's theoretical excess kurtosis (fourth moment), measuring the peakedness of the distribution and its extreme tail events. An excess kurtosis of 0 implies a normal tail.

229. B2DistributionGumbelMinMean
Returns the Gumbel Min distribution's theoretical mean or expected value (first moment), measuring the central tendency of the distribution.

230. B2DistributionGumbelMinSkew
Returns the Gumbel Min distribution's theoretical skew (third moment), measuring the direction of the distribution's tail. Positive (negative) skew means mean exceeds (is less than) median and the tail points to the right (left).

231. B2DistributionGumbelMinStdev
Returns the Gumbel Min distribution's theoretical standard deviation (second moment), measuring the width and average dispersion of all points around the mean.

232. B2DistributionHypergeometricKurtosis
Returns the Hypergeometric distribution's theoretical excess kurtosis (fourth moment), measuring the peakedness of the distribution and its extreme tail events. An excess kurtosis of 0 implies a normal tail.

233. B2DistributionHypergeometricMean
Returns the Hypergeometric distribution's theoretical mean or expected value (first moment), measuring the central tendency of the distribution.

234. B2DistributionHypergeometricSkew
Returns the Hypergeometric distribution's theoretical skew (third moment), measuring the direction of the distribution's tail. Positive (negative) skew means mean exceeds (is less than) median and the tail points to the right (left).

235. B2DistributionHypergeometricStdev
Returns the Hypergeometric distribution's theoretical standard deviation (second moment), measuring the width and average dispersion of all points around the mean.

236. B2DistributionLogisticKurtosis
Returns the Logistic distribution's theoretical excess kurtosis (fourth moment), measuring the peakedness of the distribution and its extreme tail events. An excess kurtosis of 0 implies a normal tail.

237. B2DistributionLogisticMean
Returns the Logistic distribution's theoretical mean or expected value (first moment), measuring the central tendency of the distribution.

238. B2DistributionLogisticSkew
Returns the Logistic distribution's theoretical skew (third moment), measuring the direction of the distribution's tail. Positive (negative) skew means mean exceeds (is less than) median and the tail points to the right (left).

239. B2DistributionLogisticStdev
Returns the Logistic distribution's theoretical standard deviation (second moment), measuring the width and average dispersion of all points around the mean.

240. B2DistributionLognormalKurtosis
Returns the Lognormal distribution's theoretical excess kurtosis (fourth moment), measuring the peakedness of the distribution and its extreme tail events. An excess kurtosis of 0 implies a normal tail.

241. B2DistributionLognormalMean
Returns the Lognormal distribution's theoretical mean or expected value (first moment), measuring the central tendency of the distribution.

242. B2DistributionLognormalSkew
Returns the Lognormal distribution's theoretical skew (third moment), measuring the direction of the distribution's tail. Positive (negative) skew means mean exceeds (is less than) median and the tail points to the right (left).

243. B2DistributionLognormalStdev
Returns the Lognormal distribution's theoretical standard deviation (second moment), measuring the width and average dispersion of all points around the mean.

244. B2DistributionNegativeBinomialKurtosis
Returns the Negative Binomial distribution's theoretical excess kurtosis (fourth moment), measuring the peakedness of the distribution and its extreme tail events. An excess kurtosis of 0 implies a normal tail.

245. B2DistributionNegativeBinomialMean
Returns the Negative Binomial distribution's theoretical mean or expected value (first moment), measuring the central tendency of the distribution.

246. B2DistributionNegativeBinomialSkew
Returns the Negative Binomial distribution's theoretical skew (third moment), measuring the direction of the distribution's tail. Positive (negative) skew means mean exceeds (is less than) median and the tail points to the right (left).

247. B2DistributionNegativeBinomialStdev
Returns the Negative Binomial distribution's theoretical standard deviation (second moment), measuring the width and average dispersion of all points around the mean.

248. B2DistributionNormalKurtosis
Returns the Normal distribution's theoretical excess kurtosis (fourth moment), measuring the peakedness of the distribution and its extreme tail events. An excess kurtosis of 0 implies a normal tail.

249. B2DistributionNormalMean
Returns the Normal distribution's theoretical mean or expected value (first moment), measuring the central tendency of the distribution.

250. B2DistributionNormalSkew
Returns the Normal distribution's theoretical skew (third moment), measuring the direction of the distribution's tail. Positive (negative) skew means mean exceeds (is less than) median and the tail points to the right (left).

251. B2DistributionNormalStdev
Returns the Normal distribution's theoretical standard deviation (second moment), measuring the width and average dispersion of all points around the mean.

252. B2DistributionParetoKurtosis
Returns the Pareto distribution's theoretical excess kurtosis (fourth moment), measuring the peakedness of the distribution and its extreme tail events. An excess kurtosis of 0 implies a normal tail.

253. B2DistributionParetoMean
Returns the Pareto distribution's theoretical mean or expected value (first moment), measuring the central tendency of the distribution.

254. B2DistributionParetoSkew
Returns the Pareto distribution's theoretical skew (third moment), measuring the direction of the distribution's tail. Positive (negative) skew means mean exceeds (is less than) median and the tail points to the right (left).

255. B2DistributionParetoStdev
Returns the Pareto distribution's theoretical standard deviation (second moment), measuring the width and average dispersion of all points around the mean.

256. B2DistributionPoissonKurtosis
Returns the Poisson distribution's theoretical excess kurtosis

(fourth moment), measuring the peakedness of the distribution and its extreme tail events. An excess kurtosis of 0 implies a normal tail.

257. B2DistributionPoissonMean
Returns the Poisson distribution's theoretical mean or expected value (first moment), measuring the central tendency of the distribution.

258. B2DistributionPoissonSkew
Returns the Poisson distribution's theoretical skew (third moment), measuring the direction of the distribution's tail. Positive (negative) skew means mean exceeds (is less than) median and the tail points to the right (left).

259. B2DistributionPoissonStdev
Returns the Poisson distribution's theoretical standard deviation (second moment), measuring the width and average dispersion of all points around the mean.

260. B2DistributionRayleighKurtosis
Returns the Rayleigh distribution's theoretical excess kurtosis (fourth moment), measuring the peakedness of the distribution and its extreme tail events. An excess kurtosis of 0 implies a normal tail.

261. B2DistributionRayleighMean
Returns the Rayleigh distribution's theoretical mean or expected value (first moment), measuring the central tendency of the distribution.

262. B2DistributionRayleighSkew
Returns the Rayleigh distribution's theoretical skew (third moment), measuring the direction of the distribution's tail. Positive (negative) skew means mean exceeds (is less than) median and the tail points to the right (left).

263. B2DistributionRayleighStdev
Returns the Rayleigh distribution's theoretical standard deviation (second moment), measuring the width and average dispersion of all points around the mean.

264. B2DistributionTKurtosis
Returns the Student's T distribution's theoretical excess kurtosis (fourth moment), measuring the peakedness of the distribution and its extreme tail events. An excess kurtosis of 0 implies a normal tail.

265. B2DistributionTMean
Returns the Student's T distribution's theoretical mean or expected value (first moment), measuring the central tendency of the distribution.

266. B2DistributionTSkew
Returns the Student's T distribution's theoretical skew (third moment), measuring the direction of the distribution's tail. Positive (negative) skew means mean exceeds (is less than) median and the tail points to the right (left).

267. B2DistributionTStdev
Returns the Student's T distribution's theoretical standard deviation (second moment), measuring the width and average dispersion of all points around the mean.

268. B2DistributionTriangularKurtosis
Returns the Triangular distribution's theoretical excess kurtosis (fourth moment), measuring the peakedness of the distribution and its extreme tail events. An excess kurtosis of 0 implies a normal tail.

269. B2DistributionTriangularMean
Returns the Triangular distribution's theoretical mean or expected value (first moment), measuring the central tendency of the distribution.

270. B2DistributionTriangularSkew
Returns the Triangular distribution's theoretical skew (third moment), measuring the direction of the distribution's tail. Positive (negative) skew means mean exceeds (is less than) median and the tail points to the right (left).

271. B2DistributionTriangularStdev
Returns the Triangular distribution's theoretical standard deviation (second moment), measuring the width and average dispersion of all points around the mean.

272. B2DistributionUniformKurtosis
Returns the Uniform distribution's theoretical excess kurtosis (fourth moment), measuring the peakedness of the distribution and its extreme tail events. An excess kurtosis of 0 implies a normal tail.

273. B2DistributionUniformMean
Returns the Uniform distribution's theoretical mean or expected value (first moment), measuring the central tendency of the distribution.

274. B2DistributionUniformSkew
Returns the Uniform distribution's theoretical skew (third moment), measuring the direction of the distribution's tail. Positive (negative) skew means mean exceeds (is less than) median and the tail points to the right (left).

275. B2DistributionUniformStdev
Returns the Uniform distribution's theoretical standard deviation (second moment), measuring the width and average dispersion of all points around the mean.

276. B2DistributionWeibullKurtosis
Returns the Weibull distribution's theoretical excess kurtosis (fourth moment), measuring the peakedness of the distribution and its extreme tail events. An excess kurtosis of 0 implies a normal tail.

277. B2DistributionWeibullMean
Returns the Weibull distribution's theoretical mean or expected value (first moment), measuring the central tendency of the distribution.

278. B2DistributionWeibullSkew
Returns the Weibull distribution's theoretical skew (third moment), measuring the direction of the distribution's tail. Positive (negative) skew means mean exceeds (is less than) median and the tail points to the right (left).

279. B2DistributionWeibullStdev
Returns the Weibull distribution's theoretical standard deviation (second moment), measuring the width and average dispersion of all points around the mean.

280. B2DistributionCDFBernoulli
Computes the Bernoulli distribution's theoretical Cumulative Distribution Function (CDF), that is, the cumulative probability of the distribution less than or equal to X.

281. B2DistributionCDFBeta
Computes the Beta distribution's theoretical Cumulative Distribution Function (CDF), that is, the cumulative probability of the distribution at all points less than or equal to X.

282. B2DistributionCDFBinomial
Computes the Binomial distribution's theoretical Cumulative Distribution Function (CDF), that is, the cumulative probability of the distribution at all points less than or equal to X.

283. B2DistributionCDFChiSquare
Computes the Chi-Square distribution's theoretical Cumulative Distribution Function (CDF), that is, the cumulative probability of the distribution at all points less than or equal to X.

284. B2DistributionCDFDiscreteUniform
Computes the Discrete Uniform distribution's theoretical Cumulative Distribution Function (CDF), that is, the cumulative probability of the distribution at all points less than or equal to X.

285. B2DistributionCDFExponential
Computes the Exponential distribution's theoretical Cumulative Distribution Function (CDF), that is, the cumulative probability of the distribution at all points less than or equal to X.

286. B2DistributionCDFFDist

Computes the F distribution's theoretical Cumulative Distribution Function (CDF), that is, the cumulative probability of the distribution at all points less than or equal to X.

287. B2DistributionCDFGamma
Computes the Gamma distribution's theoretical Cumulative Distribution Function (CDF), that is, the cumulative probability of the distribution at all points less than or equal to X.

288. B2DistributionCDFGeometric
Computes the Geometric distribution's theoretical Cumulative Distribution Function (CDF), that is, the cumulative probability of the distribution at all points less than or equal to X.

289. B2DistributionCDFGumbelMax
Computes the Gumbel Max distribution's theoretical Cumulative Distribution Function (CDF), that is, the cumulative probability of the distribution at all points less than or equal to X.

290. B2DistributionCDFGumbelMin
Computes the Gumbel Min distribution's theoretical Cumulative Distribution Function (CDF), that is, the cumulative probability of the distribution at all points less than or equal to X.

291. B2DistributionCDFLogistic
Computes the Logistic distribution's theoretical Cumulative Distribution Function (CDF), that is, the cumulative probability of the distribution at all points less than or equal to X.

292. B2DistributionCDFLognormal
Computes the Lognormal distribution's theoretical Cumulative Distribution Function (CDF), that is, the cumulative probability of the distribution at all points less than or equal to X.

293. B2DistributionCDFNormal
Computes the Normal distribution's theoretical Cumulative Distribution Function (CDF), that is, the cumulative probability of the distribution at all points less than or equal to X.

294. B2DistributionCDFPareto
Computes the Pareto distribution's theoretical Cumulative Distribution Function (CDF), that is, the cumulative probability of the distribution at all points less than or equal to X.

295. B2DistributionCDFPoisson
Computes the Poisson distribution's theoretical Cumulative Distribution Function (CDF), that is, the cumulative probability of the distribution at all points less than or equal to X.

296. B2DistributionCDFRayleigh
Computes the Rayleigh distribution's theoretical Cumulative Distribution Function (CDF), that is, the cumulative probability of the distribution at all points less than or equal to X.

297. B2DistributionCDFStandardNormal
Computes the Standard Normal distribution's theoretical Cumulative Distribution Function (CDF), that is, the cumulative probability of the distribution at all points less than or equal to X.

298. B2DistributionCDFTDist
Computes the Student's T distribution's theoretical Cumulative Distribution Function (CDF), that is, the cumulative probability of the distribution at all points less than or equal to X.

299. B2DistributionCDFTriangular
Computes the Triangular distribution's theoretical Cumulative Distribution Function (CDF), that is, the cumulative probability of the distribution at all points less than or equal to X.

300. B2DistributionCDFUniform
Computes the Uniform distribution's theoretical Cumulative Distribution Function (CDF), that is, the cumulative probability of the distribution at all points less than or equal to X.

301. B2DistributionCDFWeibull
Computes the Weibull distribution's theoretical Cumulative Distribution Function (CDF), that is, the cumulative probability of the distribution at all points less than or equal to X.

302. B2DistributionICDFBernoulli
Computes the Bernoulli distribution's theoretical Inverse Cumulative Distribution Function (ICDF), that is, given the cumulative probability between 0 and 1, and the distribution's parameters, the function returns the relevant X value.

303. B2DistributionICDFBeta
Computes the Beta distribution's theoretical Inverse Cumulative Distribution Function (ICDF), that is, given the cumulative probability between 0 and 1, and the distribution's parameters, the function returns the relevant X value.

304. B2DistributionICDFBinomial
Computes the Binomial distribution's theoretical Inverse Cumulative Distribution Function (ICDF), that is, given the cumulative probability between 0 and 1, and the distribution's parameters, the function returns the relevant X value.

305. B2DistributionICDFChiSquare
Computes the Chi-Square distribution's theoretical Inverse Cumulative Distribution Function (ICDF), that is, given the cumulative probability between 0 and 1, and the distribution's parameters, the function returns the relevant X value.

306. B2DistributionICDFDiscreteUniform
Computes the Discrete Uniform distribution's theoretical Inverse Cumulative Distribution Function (ICDF), that is, given the cumulative probability between 0 and 1, and the distribution's parameters, the function returns the relevant X value.

307. B2DistributionICDFExponential
Computes the Exponential distribution's theoretical Inverse Cumulative Distribution Function (ICDF), that is, given the cumulative probability between 0 and 1, and the distribution's parameters, the function returns the relevant X value.

308. B2DistributionICDFFDist
Computes the F distribution's theoretical Inverse Cumulative Distribution Function (ICDF), that is, given the cumulative probability between 0 and 1, and the distribution's parameters, the function returns the relevant X value.

309. B2DistributionICDFGamma
Computes the Gamma distribution's theoretical Inverse Cumulative Distribution Function (ICDF), that is, given the cumulative probability between 0 and 1, and the distribution's parameters, the function returns the relevant X value.

310. B2DistributionICDFGeometric
Computes the Geometric distribution's theoretical Inverse Cumulative Distribution Function (ICDF), that is, given the cumulative probability between 0 and 1, and the distribution's parameters, the function returns the relevant X value.

311. B2DistributionICDFGumbelMax
Computes the Gumbel Max distribution's theoretical Inverse Cumulative Distribution Function (ICDF), that is, given the cumulative probability between 0 and 1, and the

distribution's parameters, the function returns the relevant X value.

312. B2DistributionICDFGumbelMin
Computes the Gumbel Min distribution's theoretical Inverse Cumulative Distribution Function (ICDF), that is, given the cumulative probability between 0 and 1, and the distribution's parameters, the function returns the relevant X value.

313. B2DistributionICDFLogistic
Computes the Logistic distribution's theoretical Inverse Cumulative Distribution Function (ICDF), that is, given the cumulative probability between 0 and 1, and the distribution's parameters, the function returns the relevant X value.

314. B2DistributionICDFLognormal
Computes the Lognormal distribution's theoretical Inverse Cumulative Distribution Function (ICDF), that is, given the cumulative probability between 0 and 1, and the distribution's parameters, the function returns the relevant X value.

315. B2DistributionICDFNormal
Computes the Normal distribution's theoretical Inverse Cumulative Distribution Function (ICDF), that is, given the cumulative probability between 0 and 1, and the distribution's parameters, the function returns the relevant X value.

316. B2DistributionICDFPareto
Computes the Pareto distribution's theoretical Inverse Cumulative Distribution Function (ICDF), that is, given the cumulative probability between 0 and 1, and the distribution's parameters, the function returns the relevant X value.

317. B2DistributionICDFPoisson
Computes the Poisson distribution's theoretical Inverse Cumulative Distribution Function (ICDF), that is, given the cumulative probability between 0 and 1, and the distribution's parameters, the function returns the relevant X value.

318. B2DistributionICDFRayleigh
Computes the Rayleigh distribution's theoretical Inverse Cumulative Distribution Function (ICDF), that is, given the cumulative probability between 0 and 1, and the distribution's parameters, the function returns the relevant X value.

319. B2DistributionICDFStandardNormal
Computes the Standard Normal distribution's theoretical Inverse Cumulative Distribution Function (ICDF), that is, given the cumulative probability between 0 and 1, and the distribution's parameters, the function returns the relevant X value.

320. B2DistributionICDFTDist
Computes the Student's T distribution's theoretical Inverse Cumulative Distribution Function (ICDF), that is, given the cumulative probability between 0 and 1, and the distribution's parameters, the function returns the relevant X value.

321. B2DistributionICDFTriangular
Computes the Triangular distribution's theoretical Inverse Cumulative Distribution Function (ICDF), that is, given the cumulative probability between 0 and 1, and the distribution's parameters, the function returns the relevant X value.

322. B2DistributionICDFUniform
Computes the Uniform distribution's theoretical Inverse Cumulative Distribution Function (ICDF), that is, given the cumulative probability between 0 and 1, and the distribution's parameters, the function returns the relevant X value.

323. B2DistributionICDFWeibull
Computes the Weibull distribution's theoretical Inverse Cumulative Distribution Function (ICDF), that is, given the cumulative probability between 0 and 1, and the distribution's parameters, the function returns the relevant X value.

324. B2DistributionPDFBernoulli
Computes the Bernoulli distribution's theoretical Inverse Cumulative Distribution Function (ICDF), that is, given the cumulative probability between 0 and 1, and the distribution's parameters, the function returns the relevant X value.

325. B2DistributionPDFBeta
Computes the Beta distribution's theoretical Probability Density Function (PDF). The PDF of a discrete distribution returns the exact probability mass function or probability of occurrence but the PDF of continuous distributions are only theoretical values and not exact probabilities.

326. B2DistributionPDFBinomial
Computes the Binomial distribution's theoretical Probability Density Function (PDF). The PDF of a discrete distribution returns the exact probability mass function or probability of occurrence but the PDF of continuous distributions are only theoretical values and not exact probabilities.

327. B2DistributionPDFChiSquare
Computes the Chi-Square distribution's theoretical Probability Density Function (PDF). The PDF of a discrete distribution returns the exact probability mass function or probability of occurrence but the PDF of continuous distributions are only theoretical values and not exact probabilities.

328. B2DistributionPDFDiscreteUniform
Computes the Discrete Uniform distribution's theoretical Probability Density Function (PDF). The PDF of a discrete distribution returns the exact probability mass function or probability of occurrence but the PDF of continuous distributions are only theoretical values and not exact probabilities.

329. B2DistributionPDFExponential
Computes the Exponential distribution's theoretical Probability Density Function (PDF). The PDF of a discrete distribution returns the exact probability mass function or probability of occurrence but the PDF of continuous distributions are only theoretical values and not exact probabilities.

330. B2DistributionPDFFDist
Computes the F distribution's theoretical Probability Density Function (PDF). The PDF of a discrete distribution returns the exact probability mass function or probability of occurrence but the PDF of continuous distributions are only theoretical values and not exact probabilities.

331. B2DistributionPDFGamma
Computes the Gamma distribution's theoretical Probability Density Function (PDF). The PDF of a discrete distribution returns the exact probability mass function or probability of occurrence but the PDF of continuous distributions are only theoretical values and not exact probabilities.

332. B2DistributionPDFGeometric
Computes the Geometric distribution's theoretical Probability Density Function (PDF). The PDF of a discrete distribution returns the exact probability mass function or probability of occurrence but the PDF of continuous distributions are only theoretical values and not exact probabilities.

333. B2DistributionPDFGumbelMax
Computes the Gumbel Max distribution's theoretical Probability Density Function (PDF). The PDF of a discrete distribution returns the exact probability mass function or

probability of occurrence but the PDF of continuous distributions are only theoretical values and not exact probabilities.

334. B2DistributionPDFGumbelMin
Computes the Gumbel Min distribution's theoretical Probability Density Function (PDF). The PDF of a discrete distribution returns the exact probability mass function or probability of occurrence but the PDF of continuous distributions are only theoretical values and not exact probabilities.

335. B2DistributionPDFLogistic
Computes the Logistic distribution's theoretical Probability Density Function (PDF). The PDF of a discrete distribution returns the exact probability mass function or probability of occurrence but the PDF of continuous distributions are only theoretical values and not exact probabilities.

336. B2DistributionPDFLognormal
Computes the Lognormal distribution's theoretical Probability Density Function (PDF). The PDF of a discrete distribution returns the exact probability mass function or probability of occurrence but the PDF of continuous distributions are only theoretical and not exact probabilities.

337. B2DistributionPDFNormal
Computes the Normal distribution's theoretical Probability Density Function (PDF). The PDF of a discrete distribution returns the exact probability mass function or probability of occurrence but the PDF of continuous distributions are only theoretical values and not exact probabilities.

338. B2DistributionPDFPareto
Computes the Pareto distribution's theoretical Probability Density Function (PDF). The PDF of a discrete distribution returns the exact probability mass function or probability of occurrence but the PDF of continuous distributions are only theoretical values and not exact probabilities.

339. B2DistributionPDFPoisson
Computes the Poisson distribution's theoretical Probability Density Function (PDF). The PDF of a discrete distribution returns the exact probability mass function or probability of occurrence but the PDF of continuous distributions are only theoretical values and not exact probabilities.

340. B2DistributionPDFRayleigh
Computes the Rayleigh distribution's theoretical Probability Density Function (PDF). The PDF of a discrete distribution returns the exact probability mass function or probability of occurrence but the PDF of continuous distributions are only theoretical values and not exact probabilities.

341. B2DistributionPDFStandardNormal
Computes the Standard Normal distribution's theoretical Probability Density Function (PDF). The PDF of a discrete distribution returns the exact probability mass function or probability of occurrence but the PDF of continuous distributions are only theoretical values and not exact probabilities.

342. B2DistributionPDFTDist
Computes the Student's T distribution's theoretical Probability Density Function (PDF). The PDF of a discrete distribution returns the exact probability mass function or probability of occurrence but the PDF of continuous distributions are only theoretical values and not exact probabilities.

343. B2DistributionPDFTriangular
Computes the Triangular distribution's theoretical Probability Density Function (PDF). The PDF of a discrete distribution returns the exact probability mass function or probability of occurrence but the PDF of continuous distributions are only theoretical values and not exact probabilities.

344. B2DistributionPDFUniform
Computes the Uniform distribution's theoretical Probability Density Function (PDF). The PDF of a discrete distribution returns the exact probability mass function or probability of occurrence but the PDF of continuous distributions are only theoretical values and not exact probabilities.

345. B2DistributionPDFWeibull
Computes the Weibull distribution's theoretical Probability Density Function (PDF). The PDF of a discrete distribution returns the exact probability mass function or probability of occurrence but the PDF of continuous distributions are only theoretical values and not exact probabilities.

346. B2EquityLinkedFXCallOptionDomesticValue
Call options whose underlying asset is in a foreign equity market, and the fluctuations of the foreign exchange risk is hedged by having a strike price on the foreign exchange rate. Resulting valuation is in the domestic currency.

347. B2EquityLinkedFXPutOptionDomesticValue
Put options whose underlying asset is in a foreign equity market, and the fluctuations of the foreign exchange risk is hedged by having a strike price on the foreign exchange rate. Resulting valuation is in the domestic currency.

348. B2EWMAVolatilityForecastGivenPastPrices
Computes the annualized volatility forecast of the next period given a series of historical prices and the corresponding weights placed on the previous volatility estimate.

349. B2EWMAVolatilityForecastGivenPastVolatility
Computes the annualized volatility forecast of the next period given the previous period's volatility and changes in stock returns in the previous period.

350. B2ExtremeSpreadCallOption
Maturities are divided into two segments, and the call option pays the difference between the max assets from segment two and max of segment one.

351. B2ExtremeSpreadPutOption
Maturities are divided into two segments, and the put option pays the difference between the min of segment two's asset value and the min of segment one's asset value.

352. B2ExtremeSpreadReverseCallOption
Maturities are divided into two segments, and a reverse call pays the min from segment one less the min of segment two.

353. B2ExtremeSpreadReversePutOption
Maturities are divided into two segments, and a reverse put pays the max of segment one less the max of the segment two.

354. B2FiniteDifferenceAmericanCall
Computes the American call option using finite differencing methods, as an alternative to simulation, closed-form approximation models, and lattices.

355. B2FiniteDifferenceAmericanPut
Computes the American put option using finite differencing methods, as an alternative to simulation, closed-form approximation models, and lattices.

356. B2FiniteDifferenceEuropeanCall
Computes the European call option using finite differencing methods, as an alternative to simulation, closed-form approximation models, and lattices.

357. B2FiniteDifferenceEuropeanPut
Computes the European put option using finite differencing methods, as an alternative to simulation, closed-form approximation models, and lattices.

358. B2FixedStrikeLookbackCall
Strike price is fixed, while at expiration, the payoff is the difference between the maximum asset price less the strike price, during the lifetime of the option.

359. B2FixedStrikeLookbackPut
Strike price is fixed, while at expiration, the payoff is the maximum difference between the lowest observed asset price less the strike price, during the lifetime of the option.

360. B2FixedStrikePartialLookbackCall
Strike price is fixed, while at expiration, the payoff is the difference between the maximum asset price less the strike, during the starting period of the lookback to the maturity of the option.
361. B2FixedStrikePartialLookbackPut
Strike price is fixed, while at expiration, the payoff is the maximum difference between the lowest observed asset price less the strike, during the starting period of the lookback to the maturity of the option.
362. B2FloatingStrikeLookbackCallonMin
Strike price is floating, while at expiration, the payoff on the call option is being able to purchase the underlying asset at the minimum observed price during the life of the option.
363. B2FloatingStrikeLookbackPutonMax
Strike price is floating, while at expiration, the payoff on the put option is being able to sell the underlying asset at the maximum observed asset price during the life of the option.
364. B2FloatingStrikePartialLookbackCallonMin
Strike price is floating, while at expiration, the payoff on the call option is being able to purchase the underlying at the minimum observed asset price from inception to the end of the lookback time.
365. B2FloatingStrikePartialLookbackPutonMax
Strike price is floating, while at expiration, the payoff on the put option is being able to sell the underlying at the maximum observed asset price from inception to the end of the lookback time.
366. B2ForecastBrownianMotionSimulatedSeries
Computes the entire time-series of Brownian motion stochastic process forecast values.
367. B2ForecastDistributionValue
Computes the forecast price of an asset in the future, assuming the asset follows a Brownian motion random walk and returns the forecast price given the cumulative probability level.
368. B2ForecastDistributionValuePercentile
Computes the cumulative probability or percentile of an asset in the future, assuming the asset follows a Brownian motion random walk and returns the forecast cumulative percentile given the future price.
369. B2ForecastDistributionReturns
Computes the forecast return of an asset in the future, assuming the asset follows a Brownian motion random walk and returns the forecast percent return given the cumulative probability level.
370. B2ForecastDistributionReturnsPercentile
Computes the cumulative probability or percentile of an asset's returns in the future, assuming the asset follows a Brownian motion random walk and returns the forecast cumulative percentile given the return.
371. B2ForecastJumpDiffusionSimulatedSeries
Computes the entire time-series of a jump-diffusion stochastic process forecast values.
372. B2ForecastMeanReversionSimulatedSeries
Computes the entire time-series of a mean-reverting stochastic process forecast values.
373. B2ForecastIncrementalFinancialNeeds
Computes the incremental funds required to cover the projected organic sales growth of the company based on the projected year's financials.
374. B2ForecastIncrementalPercentSalesGrowthFinancedExternal
Computes the incremental funds as a percent of sales growth that is required from external funding to cover the projected organic sales growth of the company.
375. B2ForeignEquityDomesticCurrencyCall
Computes the value of a foreign-based equity call option struck in a domestic currency and accounting for the exchange rate volatility.
376. B2ForeignEquityDomesticCurrencyPut
Computes the value of a foreign-based equity put option struck in a domestic currency and accounting for the exchange rate volatility.
377. B2ForeignEquityFixedFXRateDomesticValueQuantoCall
Quanto call options are denominated in another currency than the underlying asset, with expanding or contracting protection coverage of the foreign exchange rates.
378. B2ForeignEquityFixedFXRateDomesticValueQuantoPut
Quanto put options are denominated in another currency than the underlying asset, with an expanding or contracting protection coverage of the foreign exchange rates.
379. B2ForwardRate
Computes the Forward Interest Rate given two Spot Rates
380. B2ForwardStartCallOption
Starts proportionally in or out of the money in the future. Alpha<1: call starts (1-A)% in the money, put starts (1-A)% out of the money. Alpha>1: call (A-1) % out of the money, puts (A-1)% in the money.
381. B2ForwardStartPutOption
Starts proportionally in or out of the money in the future. Alpha<1: call starts (1-A)% in the money, put starts (1-A)% out of the money. Alpha>1: call (A-1) % out of the money, puts (A-1)% in the money.
382. B2FuturesForwardsCallOption
Similar to a regular option but the underlying asset is a futures of forward contract. A call option is the option to buy a futures contract, with the specified futures strike price at which the futures is traded if the option is exercised.
383. B2FuturesForwardsPutOption
Similar to a regular option but the underlying asset is a futures of forward contract. A put option is the option to sell a futures contract, with the specified futures strike price at which the futures is traded if the option is exercised.
384. B2FuturesSpreadCall
The payoff of a spread option is the difference between the two futures' values at expiration. The spread is Futures 1 - Futures 2, and the call payoff is Spread - Strike value.
385. B2FuturesSpreadPut
The payoff of a spread option is the difference between the two futures' values at expiration. The spread is Futures 1 - Futures 2, and the put payoff is Strike - Spread.
386. B2GARCH
Computes the forward-looking volatility forecast using the generalized autoregressive conditional heteroskedasticity (p, q) model where future volatilities are forecast based on historical price levels and information.
387. B2GapCallOption
The call option is knocked in if the asset exceeds the reference Strike 1, and the option payoff is the asset price less Strike 2 for the underlying.
388. B2GapPutOption
The put option is knocked in only if the underlying asset is less than the reference Strike 1, providing a payoff of Strike Price 2 less the underlying asset value.
389. B2GeneralizedBlackScholesCall
Returns the Black-Scholes Model with a continuous dividend yield call option.
390. B2GeneralizedBlackScholesCallCashDividends
Modification of the Generalized Black-Scholes model to solve European call options assuming a series of dividend cash flows that may be even or uneven. A series of dividend payments and time are required.
391. B2GeneralizedBlackScholesPut
Returns the Black-Scholes Model with a continuous dividend yield put option.
392. B2GeneralizedBlackScholesPutCashDividends

Modification of the Generalized Black-Scholes model to solve European put options assuming a series of dividend cash flows that may be even or uneven. A series of dividend payments and time are required.

393. B2GraduatedBarrierDownandInCall
Barriers are graduated ranges between lower and upper values. The option is knocked in the money proportionally depending on how low the asset value is in the range.

394. B2GraduatedBarrierDownandOutCall
Barriers are graduated ranges between lower and upper values. The option is knocked out of the money proportionally depending on how low the asset value is in the range.

395. B2GraduatedBarrierUpandInPut
Barriers are graduated ranges between lower and upper values. The option is knocked in the money proportionally depending on how high the asset value is in the range.

396. B2GraduatedBarrierUpandOutPut
Barriers are graduated ranges between lower and upper values. The option is knocked out of the money proportionally depending on how high the asset value is in the range.

397. B2ImpliedVolatilityBestCase
Computes the implied volatility given an expected value of an asset, and an alternative best case scenario value and its corresponding percentile (must be above 50%).

398. B2ImpliedVolatilityCall
Computes the implied volatility in a European call option given all the inputs parameters and option value.

399. B2ImpliedVolatilityPut
Computes the implied volatility in a European put option given all the inputs parameters and option value.

400. B2ImpliedVolatilityWorstCase
Computes the implied volatility given an expected value of an asset, and an alternative worst case scenario value and its corresponding percentile (must be below 50%).

401. B2InterestAnnualtoPeriodic
Computes the periodic compounding rate based on the annualized compounding interest rate per year.

402. B2InterestCaplet
Computes the interest rate caplet (sum all the caplets into the total value of the interest rate cap) and acts like an interest rate call option.

403. B2InterestContinuousToDiscrete
Returns the corresponding discrete compounding interest rate given the continuous compounding rate.

404. B2InterestContinuousToPeriodic
Computes the periodic compounding interest rate based on a continuous compounding rate.

405. B2InterestDiscreteToContinuous
Returns the corresponding continuous compounding interest rate given the discrete compounding rate.

406. B2InterestFloorlet
Computes the interest rate floorlet (sum all the floorlets into the total value of the interest rate floor) and acts like an interest rate put option.

407. B2InterestPeriodictoAnnual
Computes the annualized compounding interest rate per year based on a periodic compounding rate.

408. B2InterestPeriodictoContinuous
Computes the continuous compounding rate based on the periodic compounding interest rate.

409. B2InverseGammaCallOption
Computes the European Call option assuming an inverse Gamma distribution, rather than a normal distribution, and is important for deep out-of-the-money options.

410. B2InverseGammaPutOption
Computes the European Put option assuming an inverse Gamma distribution, rather than a normal distribution, and is important for deep out-of-the-money options.

411. B2IRRContinuous
Returns the continuously discounted Internal Rate of Return for a cash flow series with its respective cash flow times in years.

412. B2IRRDiscrete
Returns the discretely discounted Internal Rate of Return for a cash flow series with its respective cash flow times in years.

413. B2LinearInterpolation
Interpolates and fills in the missing values of a time series.

414. B2MarketPriceRisk
Computes the market price of risk used in a variety of options analysis, using market return, risk-free return, volatility of the market and correlation between the market and the asset.

415. B2MathIncompleteGammaQ
Returns the result from an incomplete Gamma Q function.

416. B2MathIncompleteGammaP
Returns the result from an incomplete Gamma P function.

417. B2MathIncompleteBeta
Returns the result from an incomplete Beta function.

418. B2MathGammaLog
Returns the result from a log gamma function.

419. B2MatrixMultiplyAxB
Multiplies two compatible matrices, such as MxN with NxM to create an MxM matrix. Copy and paste function and use Ctrl+Shift Enter to obtain the matrix.

420. B2MatrixMultiplyAxTransposeB
Multiplies the first matrix with the transpose of the second matrix (multiplies MxN with MxN matrix by transposing the second matrix to NxM, generating an MxM matrix). Copy and paste function and use Ctrl+Shift Enter to obtain the matrix.

421. B2MatrixMultiplyTransposeAxB
Multiplies the transpose of the first matrix with the second matrix (multiplies MxN with MxN matrix by transposing the first matrix to NxM, generating an NxN matrix). Copy and paste function and use Ctrl+Shift Enter to obtain the matrix.

422. B2MatrixTranspose
Transposes a matrix, from MxN to NxM. Copy and paste function and use Ctrl+Shift Enter to obtain the matrix.

423. B2MertonJumpDiffusionCall
Call value of an underlying whose asset returns are assumed to follow a Poisson Jump Diffusion process, i.e., prices jump several times a year, and cumulatively, these jumps explain a percentage of the total asset volatility.

424. B2MertonJumpDiffusionPut
Put value of an underlying whose asset returns are assumed to follow a Poisson Jump Diffusion process, i.e., prices jump several times a year, and cumulatively, these jumps explain a percentage of the total asset volatility.

425. B2NormalTransform
Converts values into a normalized distribution.

426. B2NPVContinuous
Returns the Net Present Value of a cash flow series given the time and discount rate, using Continuous discounting.

427. B2NPVDiscrete
Returns the Net Present Value of a cash flow series given the time and discount rate, using discrete discounting.

428. B2OptionStrategyLongBearCreditSpread
Returns the matrix [stock price, buy put, sell put, profit] of a long bearish crebit spread (buying a higher strike put with a high price and selling a lower strike put with a low price).

429. B2OptionStrategyLongBullCreditSpread
Returns the matrix [stock price, buy put, sell put, profit] of a bullish credit spread (buying a low strike put at low price and selling a high strike put at high price).

430. B2OptionStrategyLongBearDebitSpread
Returns the matrix [stock price, buy call, sell call, profit] of a

long bearish debit spread (buying a high strike call with a low price and selling a lower strike call with a high price).

431. B2OptionStrategyLongBullDebitSpread
Returns the matrix [stock price, buy call, sell call, profit] of a bullish debit spread (buying a low strike call at high price and selling a further out-of-the-money high strike call at low price).

432. B2OptionStrategyLongCoveredCall
Returns the matrix [stock price, buy stock, sell call, profit] of a long covered call position (buying the stock and selling a call of the same asset).

433. B2OptionStrategyLongProtectivePut
Returns the matrix [stock price, buy stock, buy put, profit] of a long protective put position (buying the stock and buying a put of the same asset).

434. B2OptionStrategyLongStraddle
Returns the matrix [stock price, buy call, buy put, profit] of a long straddle position (buy an equal number of puts and calls with identical strike price and expiration) to profit from high volatility.

435. B2OptionStrategyLongStrangle
Returns the matrix [stock price, buy call, buy put, profit] of a long strangle (buy high strike call at low price and buy low strike put at low price (close expirations), profits from high volatility.

436. B2OptionStrategyWriteCoveredCall
Returns the matrix [stock price, sell stock, buy call, profit] of writing a covered call (selling the stock and buying a call of the same asset).

437. B2OptionStrategyWriteProtectivePut
Returns the matrix [stock price, sell stock, sell put, profit] of a long protective put position (buying the stock and buying a put of the same asset).

438. B2OptionStrategyWriteStraddle
Returns the matrix [stock price, sell call, sell put, profit] of writing a straddle position (sell an equal number of puts and calls with identical strike price and expiration) to profit from low volatility.

439. B2OptionStrategyWriteStrangle
Returns the matrix [stock price, sell call, sell put, profit] of writing a strangle (sell high strike call at low price and sell low strike put at low price (close expirations), profits from low volatility.

440. B2Payback
Computes the payback in years given some initial investment and subsequent cash flows.

441. B2PerpetualCallOption
Computes the American perpetual call option. Note that it returns an error if dividend is 0% (this is because the American option reverts to European and a perpetual European has no value).

442. B2PerpetualPutOption
Computes the American perpetual put option. Note that it returns an error if dividend is 0% (this is because the American option reverts to European and a perpetual European has no value).

443. B2PortfolioReturns
Computes the portfolio weighted average expected returns given individual asset returns and allocations.

444. B2PortfolioRisk
Computes the portfolio risk given individual asset allocations and variance-covariance matrix.

445. B2PortfolioVariance
Computes the portfolio variance given individual asset allocations and variance-covariance matrix. Take the square root of the result to obtain the portfolio risk.

446. B2ProbabilityDefaultAdjustedBondYield
Computes the required risk-adjusted yield (premium spread plus risk-free) to charge given the cumulative probability of default.

447. B2ProbabilityDefaultAverageDefaults
Credit Risk Plus' average number of credit defaults per period using total portfolio credit exposures, average cum probability of default, and percentile Value at Risk for the portfolio.

448. B2ProbabilityDefaultCorrelation
Computes the correlations of default probabilities given the probabilities of default of each asset and the correlation between their equity prices. The result is typically much smaller than the equity correlation.

449. B2ProbabilityDefaultCumulativeBondYieldApproach
Computes the cumulative probability of default from Year 0 to Maturity using a comparable zero bond yield versus a zero risk-free yield and accounting for a recovery rate.

450. B2ProbabilityDefaultCumulativeSpreadApproach
Computes the cumulative probability of default from Year 0 to Maturity using a comparable risky debt's spread (premium)versus the risk-free rate and accounting for a recovery rate.

451. B2ProbabilityDefaultHazardRate
Computes the hazard rate for a specific year (in survival analysis) using a comparable zero bond yield versus a zero risk-free yield and accounting for a recovery rate.

452. B2ProbabilityDefaultMertonDefaultDistance
Distance to Default (does not require market returns and correlations but requires the internal growth rates).

453. B2ProbabilityDefaultMertonI
Probability of Default (without regard to Equity Value or Equity Volatility, but requires Asset, Debt, and market values).

454. B2ProbabilityDefaultMertonII
Probability of Default (does not require market returns and correlations but requires the internal growth rates).

455. B2ProbabilityDefaultMertonImputedAssetValue
Returns the imputed market value of asset given external equity value, equity volatility, and other option inputs. Used in the Merton probability of default model.

456. B2ProbabilityDefaultMertonImputedAssetVolatility
Returns the imputed volatility of asset given external equity value, equity volatility, and other option inputs. Used in the Merton probability of default model.

457. B2ProbabilityDefaultMertonMVDebt
Computes the market value of debt (for risky debt) in the Merton-based simultaneous options model.

458. B2ProbabilityDefaultMertonRecoveryRate
Computes the rate of recovery in percent, for risky debt in the Merton-based simultaneous options model.

459. B2ProbabilityDefaultPercentileDefaults
Credit Risk Plus method to compute the percentile given some estimated average number of defaults per period.

460. B2PropertyDepreciation
Value of the periodic depreciation allowed on a commercial real estate project given the percent of price going to improvement and the allowed recovery period.

461. B2PropertyEquityRequired
Value of the required equity down payment on a commercial real estate project given the valuation of the project.

462. B2PropertyLoanAmount
Value of the required mortgage amount on a commercial real estate project given the value of the project and the loan required (loan to value ratio or the percentage of the value a loan is required).

463. B2PropertyValuation
Value of a commercial real estate property assuming Gross Rent, Vacancy, Operating Expenses, and the Cap Rate at Purchase Date (Net Operating Income/Sale Price).

464. B2PutCallParityCalltoPut
Computes the European put option value given the value of a corresponding European call option with identical input assumptions.
465. B2PutCallParityCalltoPutCurrencyOptions
Computes the European currency put option value given the value of a corresponding European currency call option on futures and forwards with identical input assumptions.
466. B2PutCallParityCalltoPutFutures
Computes the European put option on futures and forwards value given the value of a corresponding European call option on futures and forwards with identical input assumptions.
467. B2PutCallParityPuttoCall
Computes the European call option value given the value of a corresponding European put option with identical input assumptions.
468. B2PutCallParityPuttoCallCurrencyOptions
Computes the European currency call option value given the value of a corresponding European currency put option on futures and forwards with identical input assumptions.
469. B2PutCallParityPuttoCallFutures
Computes the European call option on futures and forwards value given the value of a corresponding European put option on futures and forwards with identical input assumptions.
470. B2PutDelta
Returns the option valuation sensitivity Delta (a put option value's sensitivity to changes in the asset value).
471. B2PutGamma
Returns the option valuation sensitivity Gamma (a put option value's sensitivity to changes in the delta value).
472. B2PutOptionOnTheMax
The maximum values at expiration of both assets are used in option exercise, where the call option payoff at expiration is the strike price against the maximum price between Asset 1 and Asset 2.
473. B2PutOptionOnTheMin
The minimum values at expiration of both assets are used in option exercise, where the call option payoff at expiration is the strike price against the minimum price between Asset 1 and Asset 2.
474. B2PutRho
Returns the option valuation sensitivity Rho (a put option value's sensitivity to changes in the interest rate).
475. B2PutTheta
Returns the option valuation sensitivity Theta (a put option value's sensitivity to changes in the maturity).
476. B2PutVega
Returns the option valuation sensitivity Vega (a put option value's sensitivity to changes in the volatility).
477. B2QueuingMCAveCustomersinSystem
Average number of customers in the system using a multiple channel queuing model assuming a Poisson arrival rate with Exponential distribution of service times.
478. B2QueuingMCAveCustomersWaiting
Average number of customers in the waiting line using a multiple channel queuing model assuming a Poisson arrival rate with Exponential distribution of service times.
479. B2QueuingMCAveTimeinSystem
Average time a customer spends in the system using a multiple channel queuing model assuming a Poisson arrival rate with Exponential distribution of service times.
480. B2QueuingMCAveTimeWaiting
Average time a customer spends in the waiting line using a multiple channel queuing model assuming a Poisson arrival rate with Exponential distribution of service times.
481. B2QueuingMCProbHaveToWait
Probability an arriving customer has to wait using a multiple channel queuing model assuming a Poisson arrival rate with Exponential distribution of service times.
482. B2QueuingMCProbNoCustomer
Probability that no customers are in the system using a multiple channel queuing model assuming a Poisson arrival rate with Exponential distribution of service times.
483. B2QueuingMGKAveCustomersinSystem
Average number of customers in the system using a multiple channel queuing model assuming a Poisson arrival rate with unknown distribution of service times.
484. B2QueuingMGKCostPerPeriod
Total cost per time period using a multiple channel queuing model assuming a Poisson arrival rate with unknown distribution of service times.
485. B2QueuingMGKProbBusy
Probability a channel will be busy using a multiple channel queuing model assuming a Poisson arrival rate with unknown distribution of service times.
486. B2QueuingSCAAveCustomersinSystem
Average number of customers in the system using an MG1 single channel arbitrary queuing model assuming a Poisson arrival rate with unknown distribution of service times.
487. B2QueuingSCAAveCustomersWaiting
Average number of customers in the waiting line using an MG1 single channel arbitrary queuing model assuming a Poisson arrival rate with unknown distribution of service times.
488. B2QueuingSCAAveTimeinSystem
Average time a customer spends in the system using an MG1 single channel arbitrary queuing model assuming a Poisson arrival rate with unknown distribution of service times.
489. B2QueuingSCAAveTimeWaiting
Average time a customer spends in the waiting line using an MG1 single channel arbitrary queuing model assuming a Poisson arrival rate with unknown distribution of service times.
490. B2QueuingSCAProbHaveToWait
Probability an arriving customer has to wait using an MG1 single channel arbitrary queuing model assuming a Poisson arrival rate with unknown distribution of service times.
491. B2QueuingSCAProbNoCustomer
Probability that no customers are in the system using an MG1 single channel arbitrary queuing model assuming a Poisson arrival rate with unknown distribution of service times.
492. B2QueuingSCAveCustomersinSystem
Average number of customers in the system using a single channel queuing model.
493. B2QueuingSCAveCustomersWaiting
Returns the average number of customers in the waiting line using a single channel queuing model.
494. B2QueuingSCAveTimeinSystem
Average time a customer spends in the system using a single channel queuing model.
495. B2QueuingSCAveTimeWaiting
Average time a customer spends in the waiting line using a single channel queuing model.
496. B2QueuingSCProbHaveToWait
Probability an arriving customer has to wait using a single channel queuing model.
497. B2QueuingSCProbNoCustomer
Returns the probability that no customers are in the system using a single channel queuing model.
498. B2RatiosBasicEarningPower
Computes the basic earning power (BEP) by accounting for earnings before interest and taxes (EBIT) and the amount of total assets employed.
499. B2RatiosBetaLevered

Computes the levered beta from an unlevered beta level after accounting for the tax rate, total debt and equity values.

500. B2RatiosBetaUnlevered
Computes the unlevered beta from a levered beta level after accounting for the tax rate, total debt and equity values.

501. B2RatiosBookValuePerShare
Computes the book value per share (BV) by accounting for the total common equity amount and number of shares outstanding.

502. B2RatiosCapitalCharge
Computes the capital charge value (typically used to compute the economic profit of a project).

503. B2RatiosCAPM
Computes the capital asset pricing model's required rate of return in percent, given some benchmark market return, beta risk coefficient, and risk-free rate.

504. B2RatiosCashFlowtoEquityLeveredFirm
Cash flow to equity for a levered firm (accounting for operating expenses, taxes, depreciation, amortization, capital expenditures, change in working capital, preferred dividends, principal repaid and new debt issues).

505. B2RatiosCashFlowtoEquityUnleveredFirm
Cash flow to equity for an unlevered firm (accounting for operating expenses, taxes, depreciation, amortization, capital expenditures, change in working capital and taxes).

506. B2RatiosCashFlowtoFirm
Cash flow to the firm (accounting for earnings before interest and taxes EBIT, tax rate, depreciation, capital expenditures and change in working capital).

507. B2RatiosCashFlowtoFirm2
Cash flow to the firm (accounting for net operating profit after taxes (NOPAT), depreciation, capital expenditures and change in working capital).

508. B2RatiosContinuingValue1
Computes the continuing value based on a constant growth rate of free cash flows to perpetuity using a Gordon Growth Model.

509. B2RatiosContinuingValue2
Computes the continuing value based on a constant growth rate of free cash flows to perpetuity using net operating profit after taxes (NOPAT), return on invested capital (ROIC), growth rate and current free cash flow.

510. B2RatiosCostEquity
Computes the cost of equity (as used in a CAPM model) using the dividend rate, growth rate of dividends, and current equity price.

511. B2RatiosCurrentRatio
Computes the current ratio by accounting for the individual asset and liabilities.

512. B2RatiosDaysSalesOutstanding
Computes the days sales outstanding by looking at the accounts receivables value, total annual sales, and number of days per year.

513. B2RatiosDebtAssetRatio
Computes the debt to asset ratio by accounting for the total debt and total asset values.

514. B2RatiosDebtEquityRatio
Computes the debt to equity ratio by accounting for the total debt and total common equity levels.

515. B2RatiosDebtRatio1
Computes the debt ratio by accounting for the total debt and total asset values.

516. B2RatiosDebtRatio2
Computes the debt ratio by accounting for the total equity and total asset values.

517. B2RatiosDividendsPerShare
Computes the dividends per share (DPS) by accounting for the dividend payment amount and number of shares outstanding.

518. B2RatiosEarningsPerShare
Computes the earnings per share (EPS) by accounting for the net income amount and number of shares outstanding.

519. B2RatiosEconomicProfit1
Computes the economic profit using invested capital, return on invested capital (ROIC) and weighted average cost of capital (WACC).

520. B2RatiosEconomicProfit2
Computes the economic profit using net operating profit after tax (NOPAT), return on invested capital (ROIC) and weighted average cost of capital (WACC).

521. B2RatiosEconomicProfit3
Computes the economic profit using net operating profit after tax (NOPAT) and capital charge.

522. B2RatiosEconomicValueAdded
Computes the economic value added using earnings before interest and taxes (EBIT), total capital employed, tax rate, and weighted average cost of capital (WACC).

523. B2RatiosEquityMultiplier
Computes the equity multiplier (the ratio of total assets to total equity).

524. B2RatiosFixedAssetTurnover
Computes the fixed asset turnover by accounting for the annual sales levels and net fixed assets.

525. B2RatiosInventoryTurnover
Computes the inventory turnover using sales and inventory levels.

526. B2RatiosMarketBookRatio1
Computes the market to book value per share by accounting for the share price and the book value (BV) per share.

527. B2RatiosMarketBookRatio2
Computes the market to book value per share by accounting for the share price, total common equity value, and the number of shares outstanding.

528. B2RatiosMarketValueAdded
Computes the market value added by accounting for the stock price, total common equity, and number of shares outstanding.

529. B2RatiosNominalCashFlow
Computes the nominal cash flow amount assuming some inflation rate, real cash flow, and the number of years in the future.

530. B2RatiosNominalDiscountRate
Computes the nominal discount rate assuming some inflation rate and real discount rate.

531. B2RatiosPERatio1
Computes the price to earnings ratio (PE) using stock price and earnings per share (EPS).

532. B2RatiosPERatio2
Computes the price to earnings ratio (PE) using stock price, net income, and number of shares outstanding.

533. B2RatiosPERatio3
Computes the price to earnings ratio (PE) using growth rates, rate of return, and discount rate.

534. B2RatiosProfitMargin
Computes the profit margin by taking the ratio of net income to annual sales.

535. B2RatiosQuickRatio
Computes the quick ratio by accounting for the individual asset and liabilities.

536. B2RatiosRealCashFlow
Computes the real cash flow amount assuming some inflation rate, nominal cash flow (Nominal CF), and the number of years in the future.

537. B2RatiosRealDiscountRate
Computes the real discount rate assuming some inflation rate and nominal discount rate.

538. B2RatiosReturnonAsset1
Computes the return in asset using net income amount and total assets employed.
539. B2RatiosReturnonAsset2
Computes the return in asset using net profit margin percentage and total asset turnover ratio.
540. B2RatiosReturnonEquity1
Computes return on equity using net income and total common equity values.
541. B2RatiosReturnonEquity2
Computes return on equity using return on asset (ROA), total asset, and total equity values.
542. B2RatiosReturnonEquity3
Computes return on equity using net income, total sales, total asset, and total common equity values.
543. B2RatiosReturnonEquity4
Computes return on equity using net profit margin, total asset turnover, and equity multiplier values.
544. B2RatiosROIC
Computes the return on invested capital (typically used for computing economic profit) accounting for change in working capital, property, plant equipment (PPE).
545. B2RatiosShareholderEquity
Computes the common shareholder's equity after accounting for total assets, total liabilities and preferred stocks.
546. B2SimulatedEuropeanCall
Returns the Monte Carlo simulated European call option (only European options can be approximated well with simulation). This function is volatile.
547. B2SimulatedEuropeanPut
Returns the Monte Carlo simulated European put option (only European options can be approximated well with simulation). This function is volatile.
548. B2RatiosTimesInterestEarned
Computes the times interest earned ratio by accounting for earnings before interest and taxes (EBIT) and the amount of interest payment.
549. B2RatiosTotalAssetTurnover
Computes the total asset turnover by accounting for the annual sales levels and total assets.
550. B2RatiosWACC1
Computes the weighted average cost of capital (WACC) using market values of debt, preferred equity, and common equity, as well as their respective costs.
551. B2RatiosWACC2
Computes the weighted average cost of capital (WACC) using market values of debt, market values of common equity, as well as their respective costs.
552. B2ROBinomialAmericanAbandonContract
Returns the American option to abandon and contract using a binomial lattice model.
553. B2ROBinomialAmericanAbandonContractExpand
Returns the American option to abandon, contract and expand using a binomial lattice model.
554. B2ROBinomialAmericanAbandonExpand
Returns the American option to abandon and expand using a binomial lattice model.
555. B2ROBinomialAmericanAbandonment
Returns the American option to abandon using a binomial lattice model.
556. B2ROBinomialAmericanCall
Returns the American call option with dividends using a binomial lattice model.
557. B2ROBinomialAmericanChangingRiskFree
Returns the American call option with dividends and assuming the risk-free rate changes over time, using a binomial lattice model.
558. B2ROBinomialAmericanChangingVolatility
Returns the American call option with dividends and assuming the volatility changes over time, using a binomial lattice model. Use small number of steps or it will take a long time to compute!
559. B2ROBinomialAmericanContractExpand
Returns the American option to contract and expand using a binomial lattice model.
560. B2ROBinomialAmericanContraction
Returns the American option to contract using a binomial lattice model.
561. B2ROBinomialAmericanCustomCall
Returns the American option call option with changing inputs, vesting periods, and suboptimal exercise multiple using a binomial lattice model.
562. B2ROBinomialAmericanExpansion
Returns the American option to expand using a binomial lattice model.
563. B2ROBinomialAmericanPut
Returns the American put option with dividends using a binomial lattice model.
564. B2ROBinomialBermudanAbandonContract
Returns the Bermudan option to abandon and contract using a binomial lattice model, where there is a vesting/blackout period where the option cannot be executed.
565. B2ROBinomialBermudanAbandonContractExpand
Returns the Bermudan option to abandon, contract and expand, using a binomial lattice model, where there is a vesting/blackout period the option cannot be executed.
566. B2ROBinomialBermudanAbandonExpand
Returns the Bermudan option to abandon and expand using a binomial lattice model, where there is a vesting/blackout period where the option cannot be executed.
567. B2ROBinomialBermudanAbandonment
Returns the Bermudan option to abandon using a binomial lattice model, where there is a vesting/blackout period where the option cannot be executed.
568. B2ROBinomialBermudanCall
Returns the Bermudan call option with dividends, where there is a vesting/blackout period where the option cannot be executed.
569. B2ROBinomialBermudanContractExpand
Returns the Bermudan option to contract and expand, using a binomial lattice model, where there is a vesting/blackout period where the option cannot be executed.
570. B2ROBinomialBermudanContraction
Returns the Bermudan option to contract using a binomial lattice model, where there is a vesting/blackout period where the option cannot be executed.
571. B2ROBinomialBermudanExpansion
Returns the Bermudan option to expand using a binomial lattice model, where there is a vesting/blackout period where the option cannot be executed.
572. B2ROBinomialBermudanPut
Returns the Bermudan put option with dividends, where there is a vesting/blackout period where the option cannot be executed.
573. B2ROBinomialEuropeanAbandonContract
Returns the European option to abandon and contract, using a binomial lattice model, where the option can only be executed at expiration.
574. B2ROBinomialEuropeanAbandonContractExpand
Returns the European option to abandon, contract and expand, using a binomial lattice model, where the option can only be executed at expiration.
575. B2ROBinomialEuropeanAbandonExpand
Returns the European option to abandon and expand, using a binomial lattice model, where the option can only be executed at expiration.

576. B2ROBinomialEuropeanAbandonment
Returns the European option to abandon using a binomial lattice model, where the option can only be executed at expiration.
577. B2ROBinomialEuropeanCall
Returns the European call option with dividends, where the option can only be executed at expiration.
578. B2ROBinomialEuropeanContractExpand
Returns the European option to contract and expand, using a binomial lattice model, where the option can only be executed at expiration.
579. B2ROBinomialEuropeanContraction
Returns the European option to contract using a binomial lattice model, where the option can only be executed at expiration.
580. B2ROBinomialEuropeanExpansion
Returns the European option to expand using a binomial lattice model, where the option can only be executed at expiration.
581. B2ROBinomialEuropeanPut
Returns the European put option with dividends, where the option can only be executed at expiration.
582. B2ROJumpDiffusionCall
Returns the closed-form model for a European call option whose underlying asset follows a Poisson jump-diffusion process.
583. B2ROJumpDiffusionPut
Returns the closed-form model for a European put option whose underlying asset follows a Poisson jump-diffusion process.
584. B2ROMeanRevertingCall
Returns the closed-form model for a European call option whose underlying asset follows a mean-reversion process.
585. B2ROMeanRevertingPut
Returns the closed-form model for a European put option whose underlying asset follows a mean-reversion process.
586. B2ROPentanomialAmericanCall
Returns the Rainbow American call option with two underlying assets (these are typically price and quantity, and are multiplied together to form a new combinatorial pentanomial lattice).
587. B2ROPentanomialAmericanPut
Returns the Rainbow American put option with two underlying assets (these are typically price and quantity, and are multiplied together to form a new combinatorial pentanomial lattice).
588. B2ROPentanomialEuropeanCall
Returns the Rainbow European call option with two underlying assets (these are typically price and quantity, and are multiplied together to form a new combinatorial pentanomial lattice).
589. B2ROPentanomialEuropeanPut
Returns the Rainbow European put option with two underlying assets (these are typically price and quantity, and are multiplied together to form a new combinatorial pentanomial lattice).
590. B2ROQuadranomialJumpDiffusionAmericanCall
Returns the American call option whose underlying asset follows a Poisson jump-diffusion process, using a combinatorial quadranomial lattice.
591. B2ROQuadranomialJumpDiffusionAmericanPut
Returns the American put option whose underlying asset follows a Poisson jump-diffusion process, using a combinatorial quadranomial lattice.
592. B2ROQuadranomialJumpDiffusionEuropeanCall
Returns the European call option whose underlying asset follows a Poisson jump-diffusion process, using a combinatorial quadranomial lattice.
593. B2ROQuadranomialJumpDiffusionEuropeanPut
Returns the European put option whose underlying asset follows a Poisson jump-diffusion process, using a combinatorial quadranomial lattice.
594. B2ROStateAmericanCall
Returns the American call option using a state jump function, where the up and down states can be asymmetrical, solved in a lattice model.
595. B2ROStateAmericanPut
Returns the American put option using a state jump function, where the up and down states can be asymmetrical, solved in a lattice model.
596. B2ROStateBermudanCall
Returns the Bermudan call option using a state jump function, where the up and down states can be asymmetrical, solved in a lattice model, and where the option cannot be exercised at certain vesting/blackout periods.
597. B2ROStateBermudanPut
Returns the Bermudan put option using a state jump function, where the up and down states can be asymmetrical, solved in a lattice model, and where the option cannot be exercised at certain vesting/blackout periods.
598. B2ROStateEuropeanCall
Returns the Bermudan call option using a state jump function, where the up and down states can be asymmetrical, solved in a lattice model, and where the option can only be exercised at maturity.
599. B2ROStateEuropeanPut
Returns the Bermudan put option using a state jump function, where the up and down states can be asymmetrical, solved in a lattice model, and where the option can only be exercised at maturity.
600. B2ROTrinomialAmericanCall
Returns the American call option with dividend, solved using a trinomial lattice.
601. B2ROTrinomialAmericanMeanRevertingCall
Returns the American call option with dividend, assuming the underlying asset is mean-reverting, and solved using a trinomial lattice.
602. B2ROTrinomialAmericanMeanRevertingPut
Returns the American call option with dividend, assuming the underlying asset is mean-reverting, and solved using a trinomial lattice.
603. B2ROTrinomialAmericanPut
Returns the American put option with dividend, solved using a trinomial lattice.
604. B2ROTrinomialBermudanCall
Returns the Bermudan call option with dividend, solved using a trinomial lattice, where during certain vesting/blackout periods, the option cannot be exercised.
605. B2ROTrinomialBermudanPut
Returns the Bermudan put option with dividend, solved using a trinomial lattice, where during certain vesting/blackout periods, the option cannot be exercised.
606. B2ROTrinomialEuropeanCall
Returns the European call option with dividend, solved using a trinomial lattice, where the option can only be exercised at maturity.
607. B2ROTrinomialEuropeanMeanRevertingCall
Returns the European call option with dividend, solved using a trinomial lattice, assuming the underlying asset is mean-reverting, and where the option can only be exercised at maturity.
608. B2ROTrinomialEuropeanMeanRevertingPut
Returns the European put option with dividend, solved using a trinomial lattice, assuming the underlying asset is mean-

reverting, and where the option can only be exercised at maturity.

609. B2ROTrinomialEuropeanPut
Returns the European put option with dividend, solved using a trinomial lattice, where the option can only be exercised at maturity.

610. B2TrinomialImpliedArrowDebreuLattice
Computes the complete set of implied Arrow-Debreu prices in an implied trinomial lattice using actual observed data. Copy and paste the function and use Ctrl+Shift+Enter to obtain the matrix.

611. B2TrinomialImpliedArrowDebreuValue
Computes the single value of implied Arrow-Debreu price (for a specific step/column and up-down event/row) in an implied trinomial lattice using actual observed data.

612. B2TrinomialImpliedCallOptionValue
Computes the European Call Option using an implied trinomial lattice approach, taking into account actual observed inputs.

613. B2TrinomialImpliedDownProbabilityLattice
Computes the complete set of implied DOWN probabilities in an implied trinomial lattice using actual observed data. Copy and paste the function and use Ctrl+Shift+Enter to obtain the matrix.

614. B2TrinomialImpliedDownProbabilityValue
Computes the single value of implied DOWN probability (for a specific step/column and up-down event/row) in an implied trinomial lattice using actual observed data.

615. B2TrinomialImpliedLocalVolatilityLattice
Computes the complete set of implied local probabilities in an implied trinomial lattice using actual observed data. Copy and paste the function and use Ctrl+Shift+Enter to obtain the matrix.

616. B2TrinomialImpliedLocalVolatilityValue
Computes the single value of localized volatility (for a specific step/column and up-down event/row) in an implied trinomial lattice using actual observed data.

617. B2TrinomialImpliedUpProbabilityLattice
Computes the complete set of implied UP probabilities in an implied trinomial lattice using actual observed data. Copy and paste the function and use Ctrl+Shift+Enter to obtain the matrix.

618. B2TrinomialImpliedUpProbabilityValue
Computes the single value of implied UP probability (for a specific step/column and up-down event/row) in an implied trinomial lattice using actual observed data.

619. B2TrinomialImpliedPutOptionValue
Computes the European Put Option using an implied trinomial lattice approach, taking into account actual observed inputs.

620. B2SharpeRatio
Computes the Sharpe Ratio (returns to risk ratio) based on a series of stock prices of an asset and a market benchmark series of prices.

621. B2SCurveValue
Computes the S-Curve extrapolation's next forecast value based on previous value, growth rate and maximum capacity levels.

622. B2SCurveValueSaturation
Computes the S-Curve extrapolation's saturation level based on previous value, growth rate and maximum capacity levels.

623. B2SemiStandardDeviationPopulation
Computes the semi-standard deviation of the population, that is, only the values below the mean are used to compute an adjusted population standard deviation, a more appropriate measure of downside risk.

624. B2SemiStandardDeviationSample
Computes the semi-standard deviation of the sample, that is, only the values below the mean are used to compute an adjusted sample standard deviation, a more appropriate measure of downside risk.

625. B2SimulateBernoulli
Returns simulated random numbers from the Bernoulli distribution. Type in RAND() as the random input parameter to generate volatile random values from this distribution.

626. B2SimulateBeta
Returns simulated random numbers from the Beta distribution. Type in RAND() as the random input parameter to generate volatile random values from this distribution.

627. B2SimulateBinomial
Returns simulated random numbers from the Binomial distribution. Type in RAND() as the random input parameter to generate volatile random values from this distribution.

628. B2SimulateChiSquare
Returns simulated random numbers from the Chi-Square distribution. Type in RAND() as the random input parameter to generate volatile random values from this distribution.

629. B2SimulateDiscreteUniform
Returns simulated random numbers from the Discrete Uniform distribution. Type in RAND() as the random input parameter to generate volatile random values from this distribution.

630. B2SimulateExponential
Returns simulated random numbers from the Exponential distribution. Type in RAND() as the random input parameter to generate volatile random values from this distribution.

631. B2SimulateFDist
Returns simulated random numbers from the F distribution. Type in RAND() as the random input parameter to generate volatile random values from this distribution.

632. B2SimulateGamma
Returns simulated random numbers from the Gamma distribution. Type in RAND() as the random input parameter to generate volatile random values from this distribution.

633. B2SimulateGeometric
Returns simulated random numbers from the Geometric distribution. Type in RAND() as the random input parameter to generate volatile random values from this distribution.

634. B2SimulateGumbelMax
Returns simulated random numbers from the Gumbel Max distribution. Type in RAND() as the random input parameter to generate volatile random values from this distribution.

635. B2SimulateGumbelMin
Returns simulated random numbers from the Gumbel Min distribution. Type in RAND() as the random input parameter to generate volatile random values from this distribution.

636. B2SimulateLogistic
Returns simulated random numbers from the Logistic distribution. Type in RAND() as the random input parameter to generate volatile random values from this distribution.

637. B2SimulateLognormal
Returns simulated random numbers from the Lognormal distribution. Type in RAND() as the random input parameter to generate volatile random values from this distribution.

638. B2SimulateNormal
Returns simulated random numbers from the Normal distribution. Type in RAND() as the random input parameter to generate volatile random values from this distribution.

639. B2SimulatePareto
Returns simulated random numbers from the Pareto distribution. Type in RAND() as the random input parameter to generate volatile random values from this distribution.

640. B2SimulatePoisson
Returns simulated random numbers from the Poisson distribution. Type in RAND() as the random input parameter to generate volatile random values from this distribution.

641. B2SimulateRayleigh
Returns simulated random numbers from the Rayleigh distribution. Type in RAND() as the random input parameter to generate volatile random values from this distribution.
642. B2SimulateStamndardNormal
Returns simulated random numbers from the Standard Normal distribution. Type in RAND() as the random input parameter to generate volatile random values from this distribution.
643. B2SimulateTDist
Returns simulated random numbers from the Student's T distribution. Type in RAND() as the random input parameter to generate volatile random values from this distribution.
644. B2SimulateTriangular
Returns simulated random numbers from the Triangular distribution. Type in RAND() as the random input parameter to generate volatile random values from this distribution.
645. B2SimulateUniform
Returns simulated random numbers from the Uniform distribution. Type in RAND() as the random input parameter to generate volatile random values from this distribution.
646. B2SimulateWeibull
Returns simulated random numbers from the Weibull distribution. Type in RAND() as the random input parameter to generate volatile random values from this distribution.
647. B2SixSigmaControlCChartCL
Computes the center line in a control c-chart. C-charts are applicable when only the number of defects are important.
648. B2SixSigmaControlCChartDown1Sigma
Computes the lower 1 sigma limit in a control c-chart. C-charts are applicable when only the number of defects are important.
649. B2SixSigmaControlCChartDown2Sigma
Computes the lower 2 sigma limit in a control c-chart. C-charts are applicable when only the number of defects are important.
650. B2SixSigmaControlCChartLCL
Computes the lower control limit in a control c-chart. C-charts are applicable when only the number of defects are important.
651. B2SixSigmaControlCChartUCL
Computes the upper control limit in a control c-chart. C-charts are applicable when only the number of defects are important.
652. B2SixSigmaControlCChartUp1Sigma
Computes the upper 1 sigma limit in a control c-chart. C-charts are applicable when only the number of defects are important.
653. B2SixSigmaControlCChartUp2Sigma
Computes the upper 2 sigma limit in a control c-chart. C-charts are applicable when only the number of defects are important.
654. B2SixSigmaControlNPChartCL
Computes the center line in a control np-chart. NP-charts are applicable when proportions of defects are important, and where in each experimental subgroup, the number of sample size is constant.
655. B2SixSigmaControlNPChartDown1Sigma
Computes the lower 1 sigma limit in a control np-chart. NP-charts are applicable when proportions of defects are important, and where in each experimental subgroup, the number of sample size is constant.
656. B2SixSigmaControlNPChartDown2Sigma
Computes the lower 2 sigma limit in a control np-chart. NP-charts are applicable when proportions of defects are important, and where in each experimental subgroup, the number of sample size is constant.
657. B2SixSigmaControlNPChartLCL
Computes the lower control limit in a control np-chart. NP-charts are applicable when proportions of defects are important, and where in each experimental subgroup, the number of sample size is constant.
658. B2SixSigmaControlNPChartUCL
Computes the upper control limit in a control np-chart. NP-charts are applicable when proportions of defects are important, and where in each experimental subgroup, the number of sample size is constant.
659. B2SixSigmaControlNPChartUp1Sigma
Computes the upper 1 sigma limit in a control np-chart. NP-charts are applicable when proportions of defects are important, and where in each experimental subgroup, the number of sample size is constant.
660. B2SixSigmaControlNPChartUp2Sigma
Computes the upper 2 sigma limit in a control np-chart. NP-charts are applicable when proportions of defects are important, and where in each experimental subgroup, the number of sample size is constant.
661. B2SixSigmaControlPChartCL
Computes the center line in a control p-chart. P-charts are applicable when proportions of defects are important, and where in each experimental subgroup, the number of sample size might be different.
662. B2SixSigmaControlPChartDown1Sigma
Computes the lower 1 sigma limit in a control p-chart. P-charts are applicable when proportions of defects are important, and where in each experimental subgroup, the number of sample size might be different.
663. B2SixSigmaControlPChartDown2Sigma
Computes the lower 2 sigma limit in a control p-chart. P-charts are applicable when proportions of defects are important, and where in each experimental subgroup, the number of sample size might be different.
664. B2SixSigmaControlPChartLCL
Computes the lower control limit in a control p-chart. P-charts are applicable when proportions of defects are important, and where in each experimental subgroup, the number of sample size might be different.
665. B2SixSigmaControlPChartUCL
Computes the upper control limit in a control p-chart. P-charts are applicable when proportions of defects are important, and where in each experimental subgroup, the number of sample size might be different.
666. B2SixSigmaControlPChartUp1Sigma
Computes the upper 1 sigma limit in a control p-chart. P-charts are applicable when proportions of defects are important, and where in each experimental subgroup, the number of sample size might be different.
667. B2SixSigmaControlPChartUp2Sigma
Computes the upper 2 sigma limit in a control p-chart. P-charts are applicable when proportions of defects are important, and where in each experimental subgroup, the number of sample size might be different.
668. B2SixSigmaControlRChartCL
Computes the center line in a control R-chart. X-charts are used when the number of defects are important, in each subgroup experiment multiple measurements are taken, and the range of the measurements is the variable plotted.
669. B2SixSigmaControlRChartLCL
Computes the lower control limit in a control R-chart. X-charts are used when the number of defects are important, in each subgroup experiment multiple measurements are taken, and the range of the measurements is the variable plotted.
670. B2SixSigmaControlRChartUCL
Computes the upper control limit in a control R-chart. X-charts are used when the number of defects are important,

in each subgroup experiment multiple measurements are taken, and the range of the measurements is the variable plotted.

671. B2SixSigmaControlUChartCL
Computes the center line in a control u-chart. U-charts are applicable when number of defects are important, and where in each experimental subgroup, the number of sample sizes are the same.

672. B2SixSigmaControlUChartDown1Sigma
Computes the lower 1 sigma limit in a control u-chart. U-charts are applicable when number of defects are important, and where in each experimental subgroup, the number of sample sizes are the same.

673. B2SixSigmaControlUChartDown2Sigma
Computes the lower 2 sigma limit in a control u-chart. U-charts are applicable when number of defects are important, and where in each experimental subgroup, the number of sample sizes are the same.

674. B2SixSigmaControlUChartLCL
Computes the lower control limit in a control u-chart. U-charts are applicable when number of defects are important, and where in each experimental subgroup, the number of sample sizes are the same.

675. B2SixSigmaControlUChartUCL
Computes the upper control limit in a control u-chart. U-charts are applicable when number of defects are important, and where in each experimental subgroup, the number of sample sizes are the same.

676. B2SixSigmaControlUChartUp1Sigma
Computes the upper 1 sigma limit in a control u-chart. U-charts are applicable when number of defects are important, and where in each experimental subgroup, the number of sample sizes are the same.

677. B2SixSigmaControlUChartUp2Sigma
Computes the upper 2 sigma limit in a control u-chart. U-charts are applicable when number of defects are important, and where in each experimental subgroup, the number of sample sizes are the same.

678. B2SixSigmaControlXChartCL
Computes the center line in a control X-chart. X-charts are used when the number of defects are important, in each subgroup experiment multiple measurements are taken, and the average of the measurements is the variable plotted.

679. B2SixSigmaControlXChartLCL
Computes the lower control limit in a control X-chart. X-charts are used when the number of defects are important, in each subgroup experiment multiple measurements are taken, and the average of the measurements is the variable plotted.

680. B2SixSigmaControlXChartUCL
Computes the upper control limit in a control X-chart. X-charts are used when the number of defects are important, in each subgroup experiment multiple measurements are taken, and the average of the measurements is the variable plotted.

681. B2SixSigmaControlXMRChartCL
Computes the center line in a control XmR-chart. XmR-are used when the number of defects are important with only a single measurement for each sample and a time-series of moving ranges is the variable plotted.

682. B2SixSigmaControlXMRChartLCL
Computes the lower control limit in a control XmR-chart. XmR-are used when the number of defects are important with only a single measurement for each sample and a time-series of moving ranges is the variable plotted.

683. B2SixSigmaControlXMRChartUCL
Computes the upper control limit in a control XmR-chart. XmR-are used when the number of defects are important with only a single measurement for each sample and a time-series of moving ranges is the variable plotted.

684. B2SixSigmaDeltaPrecision
Computes the error precision given specific levels of Type I and Type II errors, as well as the sample size and variance.

685. B2SixSigmaSampleSize
Computes the required minimum sample size given Type I and Type II errors, as well as the required precision of the mean and the error tolerances.

686. B2SixSigmaSampleSizeDPU
Computes the required minimum sample size given Type I and Type II errors, as well as the required precision of the defects per unit and the error tolerances.

687. B2SixSigmaSampleSizeProportion
Computes the required minimum sample size given Type I and Type II errors, as well as the required precision of the proportion of defects and the error tolerances.

688. B2SixSigmaSampleSizeStdev
Computes the required minimum sample size given Type I and Type II errors, as well as the required precision of the standard deviation and the error tolerances.

689. B2SixSigmaSampleSizeZeroCorrelTest
Computes the required minimum sample size to test if a correlation is statistically significant at an alpha of 0.05 and beta of 0.10.

690. B2SixSigmaStatCP
Computes the potential process capability index Cp given the actual mean and sigma of the process, including the upper and lower specification limits.

691. B2SixSigmaStatCPK
Computes the process capability index Cpk given the actual mean and sigma of the process, including the upper and lower specification limits.

692. B2SixSigmaStatDPMO
Computes the defects per million opportunities (DPMO) given the actual mean and sigma of the process, including the upper and lower specification limits.

693. B2SixSigmaStatDPU
Computes the proportion of defective units (DPU) given the actual mean and sigma of the process, including the upper and lower specification limits.

694. B2SixSigmaStatProcessSigma
Computes the process sigma level given the actual mean and sigma of the process, including the upper and lower specification limits.

695. B2SixSigmaStatYield
Computes the nondefective parts or the yield of the process given the actual mean and sigma of the process, including the upper and lower specification limits.

696. B2SixSigmaUnitCPK
Computes the process capability index Cpk given the actual counts of defective parts and the total opportunities in the population.

697. B2SixSigmaUnitDPMO
Computes the defects per million opportunities (DPMO) given the actual counts of defective parts and the total opportunities in the population.

698. B2SixSigmaUnitDPU
Computes the proportion of defective units (DPU) given the actual counts of defective parts and the total opportunities in the population.

699. B2SixSigmaUnitProcessSigma
Computes the process sigma level given the actual counts of defective parts and the total opportunities in the population.

700. B2SixSigmaUnitYield
Computes the nondefective parts or the yield of the process given the actual counts of defective parts and the total opportunities in the population.

701. B2StandardNormalBivariateCDF
Given the two Z-scores and correlation, returns the value of the bivariate standard normal (means of zero, variances of 1) cumulative distribution function.

702. B2StandardNormalCDF
Given the Z-score, returns the value of the standard normal (mean of zero, variance of 1) cumulative distribution function.

703. B2StandardNormalInverseCDF
Computes the inverse cumulative distribution function of a standard normal distribution (mean of 0 and variance of 1)

704. B2StandardNormalPDF
Given the Z-score, returns the value of the standard normal (mean of zero, variance of 1) probability density function.

705. B2StockIndexCallOption
Similar to a regular call option but the underlying asset is a reference stock index such as the Standard and Poors 500. The analysis can be solved using a Generalized Black-Scholes-Merton Model as well.

706. B2StockIndexPutOption
Similar to a regular put option but the underlying asset is a reference stock index such as the Standard and Poors 500. The analysis can be solved using a Generalized Black-Scholes-Merton Model as well.

707. B2SuperShareOptions
The option has value only if the stock or asset price is between the upper and lower barriers, and at expiration, provides a payoff equivalent to the stock or asset price divided by the lower strike price (S/X Lower).

708. B2SwaptionEuropeanPayer
European Call Interest Swaption.

709. B2SwaptionEuropeanReceiver
European Put Interest Swaption.

710. B2TakeoverFXOption
At a successful takeover (foreign firm value in foreign currency is less than the foreign currency units), option holder can purchase the foreign units at a predetermined strike price (in exchange rates of the domestic to foreign currency).

711. B2TimeSwitchOptionCall
Holder gets AccumAmount x TimeSteps each time asset > strike for a call. TimeSteps is frequency asset price is checked if strike is breached (e.g., for 252 trading days, set DT as 1/252).

712. B2TimeSwitchOptionPut
Holder gets AccumAmount x TimeSteps each time asset < strike for a put. TimeSteps is frequency asset price is checked if strike is breached (e.g., for 252 trading days, set DT as 1/252).

713. B2TradingDayAdjustedCall
Call option corrected for varying volatilities (higher on trading days than on non-trading days). Trading Days Ratio is the number of trading days left until maturity divided by total trading days per year (between 250 and 252).

714. B2TradingDayAdjustedPut
Put option corrected for varying volatilities (higher on trading days than on non-trading days). Trading Days Ratio is the number of trading days left until maturity divided by total trading days per year (between 250 and 252).

715. B2TwoAssetBarrierDownandInCall
Valuable or knocked in-the-money only if the lower barrier is breached (reference Asset 2 goes below the barrier), and the payout is in the option on Asset 1 less the strike price.

716. B2TwoAssetBarrierDownandInPut
Valuable or knocked in-the-money only if the lower barrier is breached (reference Asset 2 goes below the barrier), and the payout is in the option on the strike price less the Asset 1 value.

717. B2TwoAssetBarrierDownandOutCall
Valuable or stays in-the-money only if the lower barrier is not breached (reference Asset 2 does not go below the barrier), and the payout is in the option on Asset 1 less the strike price.

718. B2TwoAssetBarrierDownandOutPut
Valuable or stays in-the-money only if the lower barrier is not breached (reference Asset 2 does not go below the barrier), and the payout is in the option on the strike price less the Asset 1 value.

719. B2TwoAssetBarrierUpandInCall
Valuable or knocked in-the-money only if the upper barrier is breached (reference Asset 2 goes above the barrier), and the payout is in the option on Asset 1 less the strike price.

720. B2TwoAssetBarrierUpandInPut
Valuable or knocked in-the-money only if the upper barrier is breached (reference Asset 2 goes above the barrier), and the payout is in the option on the strike price less the Asset 1 value.

721. B2TwoAssetBarrierUpandOutCall
Valuable or stays in-the-money only if the upper barrier is not breached (reference Asset 2 does not go above the barrier), and the payout is in the option on Asset 1 less the strike price.

722. B2TwoAssetBarrierUpandOutPut
Valuable or stays in-the-money only if the upper barrier is not breached (reference Asset 2 does not go above the barrier), and the payout is in the option on the strike price less the Asset 1 value.

723. B2TwoAssetCashOrNothingCall
Pays cash at expiration as long as both assets are in the money. For call options, both asset values must be above their respective strike prices.

724. B2TwoAssetCashOrNothingDownUp
Cash will only be paid if at expiration, the first asset is below the first strike, and the second asset is above the second strike.

725. B2TwoAssetCashOrNothingPut
Pays cash at expiration as long as both assets are in the money. For put options, both assets must be below their respective strike prices).

726. B2TwoAssetCashOrNothingUpDown
Cash will only be paid if the first asset is above the first strike price, and the second asset is below the second strike price at maturity.

727. B2TwoAssetCorrelationCall
Asset 1 is the benchmark asset, whereby if at expiration Asset 1's values exceed Strike 1's value, then the option is knocked in the money, and the payoff on the option is Asset 2 - Strike 2, otherwise the option becomes worthless.

728. B2TwoAssetCorrelationPut
Asset 1 is the benchmark asset, whereby if at expiration Asset 1's value is below Strike 1's value, then the put option is knocked in the money, and the payoff on the option is Strike 2 - Asset 2, otherwise the option becomes worthless.

729. B2VaRCorrelationMethod
Computes the Value at Risk using the Variance-Covariance and Correlation method, accounting for a specific VaR percentile and holding period.

730. B2VarOptions
Computes the Value at Risk of a portfolio of correlated options.

731. B2Volatility
Returns the Annualized Volatility of time-series cash flows. Enter in the number of periods in a cycle to annualize the volatility (1=annual, 4=quarter, 12=monthly data.

732. B2VolatilityImpliedforDefaultRisk
Only used when computing the implied volatility required for

optimizing an option model to compute the probability of default.

733. B2WarrantsDilutedValue
Returns the value of a warrant (like an option) that is convertible to stock while accounting for dilution effects based on the number of shares and warrants outstanding.
734. B2WriterExtendibleCallOption
The call option is extended beyond the initial maturity to an extended date with a new extended strike if at maturity the option is out of the money, providing a safety net of time for the option holder.
735. B2WriterExtendiblePutOption
The put option is extended beyond the initial maturity to an extended date with a new extended strike if at maturity the option is out of the money, providing a safety net of time for the option holder.
736. B2YieldCurveBIM
Returns the Yield Curve at various points in time using the Bliss model.
737. B2YieldCurveNS
Returns the Yield Curve at various points in time using the Nelson-Siegel approach.
738. B2ZEOB
Returns the Economic Order Batch or the optimal quantity to be manufactured on each production batch.
739. B2ZEOBBatch
Returns the Economic Order Batch analysis' optimal number of batches to be manufactured per year.
740. B2ZEOBHoldingCost
Returns the Economic Order Batch analysis' cost of holding excess units per year if manufactured at the optimal level.
741. B2ZEOBProductionCost
Returns the Economic Order Batch analysis' total cost of setting up production per year if manufactured at the optimal level.
742. B2ZEOBTotalCost
Returns the Economic Order Batch analysis' total cost of production and holding costs per year if manufactured at the optimal level.
743. B2ZEOQ
Economic Order Quantity's order size on each order.
744. B2ZEOQExcess
Economic Order Quantity's excess safety stock level
745. B2ZEOQOrders
Economic Order Quantity's number of orders per year
746. B2ZEOQProbability
Economic Order Quantity's probability of out of stock
747. B2ZEOQReorderPoint
Economic Order Quantity's reorder point

The following lists the statistical and analytical tools in the Modeling Toolkit:

748. Statistical Tool: Chi-Square Goodness of Fit Test
749. Statistical Tool: Chi-Square Independence Test
750. Statistical Tool: Chi-Square Population Variance Test
751. Statistical Tool: Dependent Means (T)
752. Statistical Tool: Friedman's Test
753. Statistical Tool: Independent and Equal Variances (T)
754. Statistical Tool: Independent and Unequal Variances (T)
755. Statistical Tool: Independent Means (Z)
756. Statistical Tool: Independent Proportions (Z)
757. Statistical Tool: Independent Variances (F)
758. Statistical Tool: Kruskal-Wallis Test
759. Statistical Tool: Lilliefors Test
760. Statistical Tool: Principal Component Analysis
761. Statistical Tool: Randomized Block Multiple Treatments
762. Statistical Tool: Runs Test
763. Statistical Tool: Single Factor Multiple Treatments
764. Statistical Tool: Testing Means (T)
765. Statistical Tool: Testing Means (Z)
766. Statistical Tool: Testing Proportions (Z)
767. Statistical Tool: Two-Way ANOVA
768. Statistical Tool: variance-Covariance Matrix
769. Statistical Tool: Wilcoxon Signed-Rank Test (One Variable)
770. Statistical Tool: Wilcoxon Signed-Rank Test (Two Variables)
771. Valuation Tool: Lattice Maker for Debt
772. Valuation Tool: Lattice Maker for Yield

The following lists Risk Simulator tools/applications that are used in the Modeling Toolkit:

773. Monte Carlo Simulation using 25 statistical distributions
774. Monte Carlo Simulation: Simulations with Correlations
775. Monte Carlo Simulation: Simulations with Precision Control
776. Monte Carlo Simulation: Simulations with Truncation
777. Stochastic Forecasting: Box-Jenkins ARIMA
778. Stochastic Forecasting: Maximum Likelihood
779. Stochastic Forecasting: Nonlinear Extrapolation
780. Stochastic Forecasting: Regression Analysis
781. Stochastic Forecasting: Stochastic Processes
782. Stochastic Forecasting: Time-Series Analysis
783. Portfolio Optimization: Discrete Binary Decision Variables
784. Portfolio Optimization: Discrete Decision Variables
785. Portfolio Optimization: Discrete Continuous Decision Variables
786. Portfolio Optimization: Static Optimization
787. Portfolio Optimization: Dynamic Optimization
788. Portfolio Optimization: Stochastic Optimization
789. Simulation Tools: Bootstrap Simulation
790. Simulation Tools: Custom Historical Simulation
791. Simulation Tools: Data Diagnostics
792. Simulation Tools: Distributional Analysis
793. Simulation Tools: Multiple Correlated Data Fitting
794. Simulation Tools: Scenario Analysis
795. Simulation Tools: Sensitivity Analysis
796. Simulation Tools: Single Data Fitting
797. Simulation Tools: Statistical Analysis
798. Simulation Tools: Tornado Analysis

The following lists Real Options SLS tools/applications used in the Modeling Toolkit:

799. Audit Sheet Functions
800. Changing Volatility and Risk-free Rates Model
801. Lattice Maker
802. SLS Single Asset and Single Phase: American Options
803. SLS Single Asset and Single Phase: Bermudan Options
804. SLS Single Asset and Single Phase: Customized Options
805. SLS Single Asset and Single Phase: European Options
806. SLS Multiple Asset and Multiple Phases
807. SLS Multinomial Lattices: Trinomials
808. SLS Multinomial Lattices: Trinomial Mean-Reversion
809. SLS Multinomial Lattices: Quadranomials
810. SLS Multinomial Lattices: Pentanomials