RISKO

Risk-Lab

- Portable Monte-Carlo Simulation of MS Excel® models

RISK-LAB

mail@risk-o.com

www.risk-lab.com

Risk-Lab

System overview

Risk-Lab

Connectivity

- Risk-Lab can run Monte-Carlo simulations of any model designed in MS Excel®.
- It does not require the use of *add-ins* or macros

Productivity

- Risk-Lab employs a streamlined object-oriented user interface, with presentation-quality graphics and tables. All results can be easily exported.
- It operates with any version of MS Excel®.
- It is possible to simulate cells containing formulas.
- Being a portable application, it is possible to take the software with you in a USB flash drive or cloud drive and use it on any PC connected to the web.

Dependability

- Being a stand-alone application, Risk-Lab is independent to the spreadsheet. Model design and analysis may be entirely conducted inside its specialized environment.

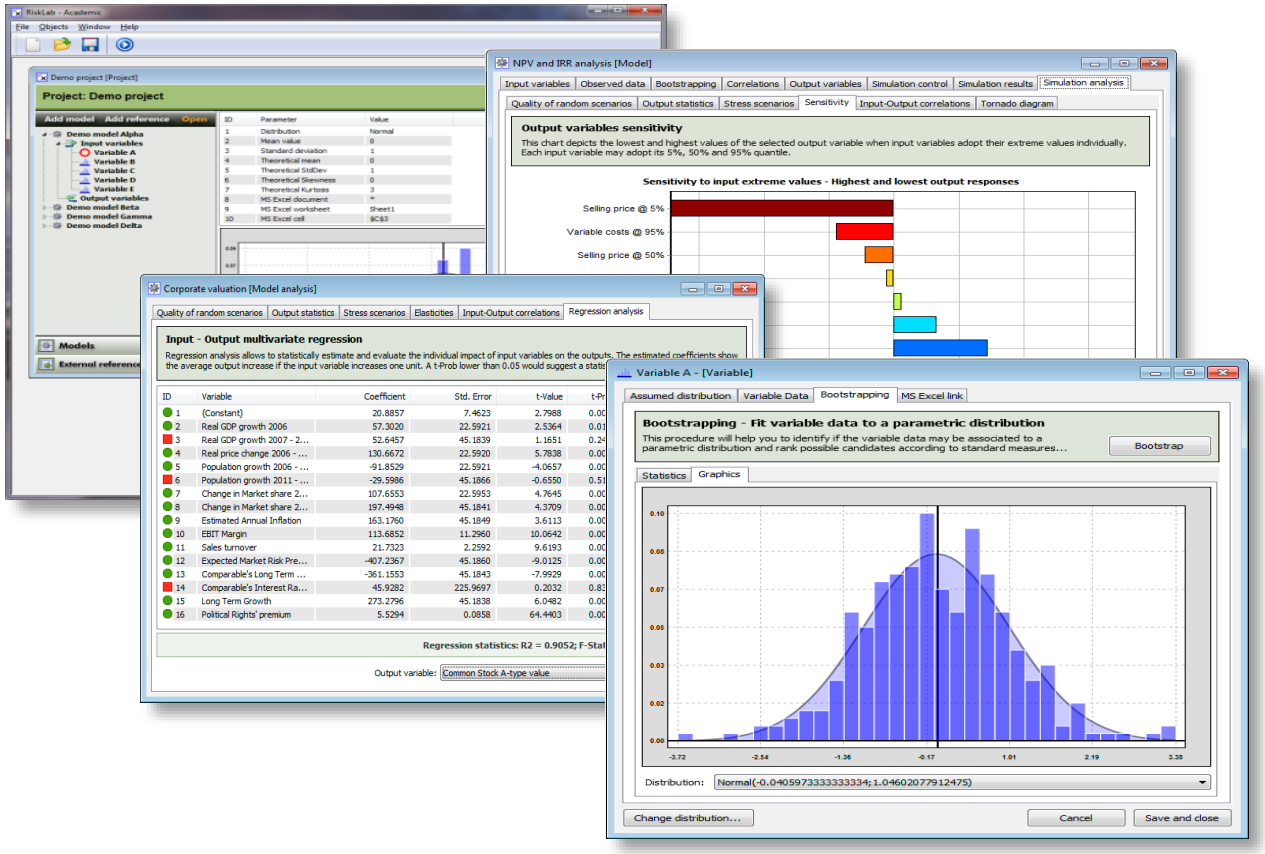
Designed for decision-making

- Risk-Lab can help you detect which variables have more impact on results, model past behavior of data series, fit statistical distributions for assumptions, calculate inter-variable correlations, percentiles and more.
- Risk-Lab implements state-of-the-art Elliptic and Archimedean copulas to generate random scenarios.
- Site licenses allow an institution to provide Risk-Lab access to a whole community in one simple step. No individual PC installations are needed.

Program interface

Welcome to a better user experience

Risk-Lab



- Projects and models are configured and analyzed from Risk-Lab's specialized interface outside the spreadsheet.
- Risk-Lab transparently communicates with MS Excel® spreadsheets to automatically introduce simulated scenarios and retrieve results at high speed.
- Say goodbye to spreadsheet chaos. The structure and results of your models will be always available and neatly presented inside Risk-Lab.

Model simulation

Remote spreadsheet operation

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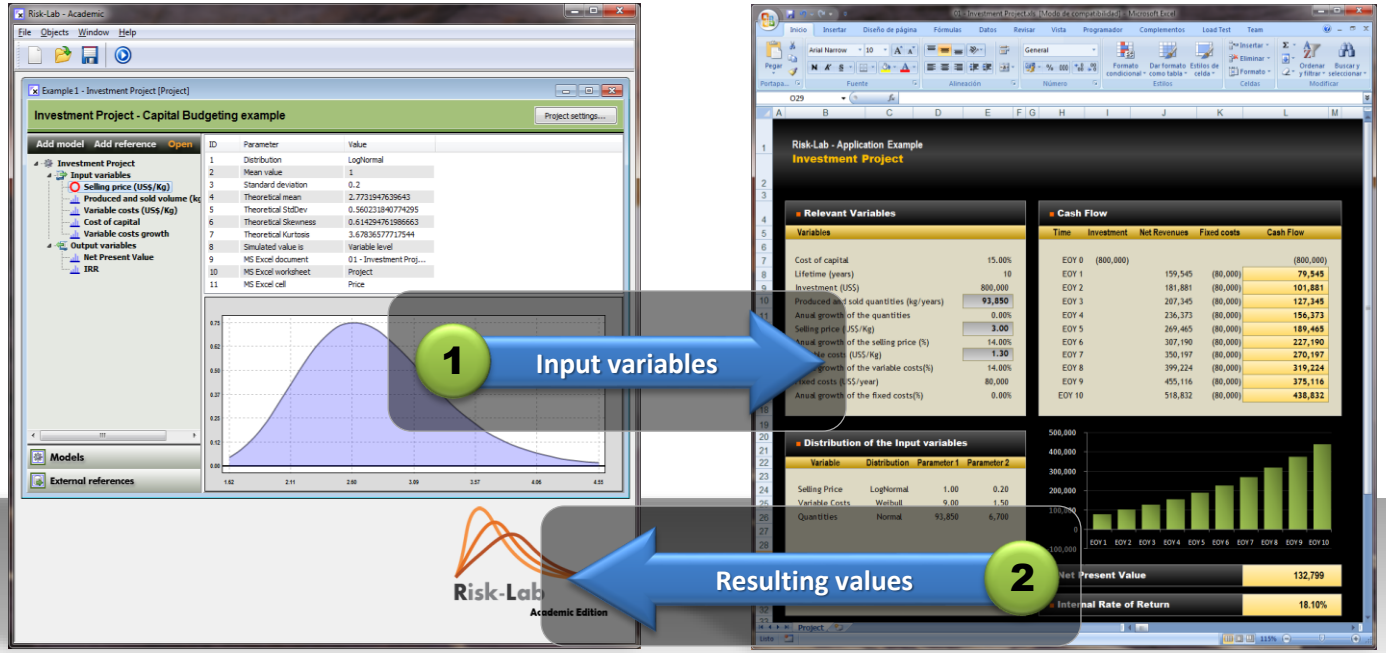

- Risk-Lab connects to the spreadsheet operates it remotely. While the simulation is running, Risk-Lab injects the simulated values into the designated input cells, recalculates formulas and extracts resulting values from the output cells.

Assumptions

Statistical distributions

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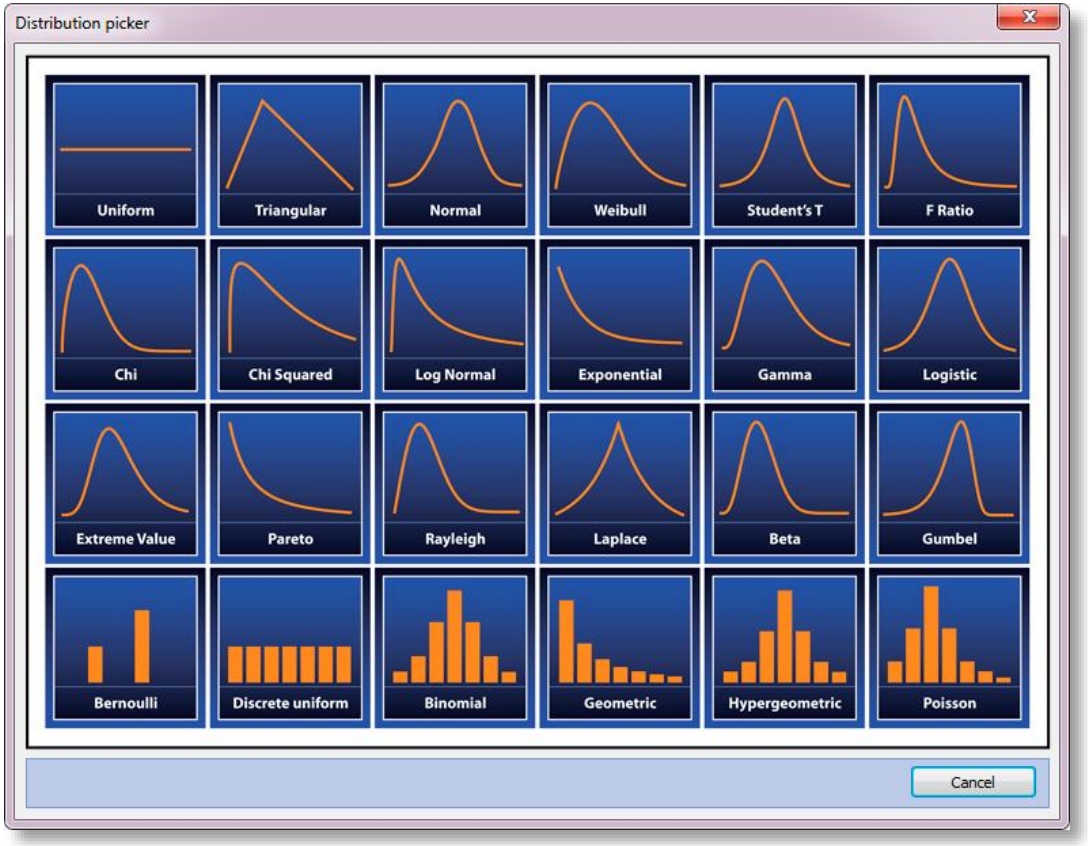

- Risk-Lab allows you to associate your assumptions to more than 20 different probability distributions, both continuous and discrete.
- Distributions can be manually or auto-matically parameterized, if observed data is available. Inter-variable correlations can also be automatically estimated by the program.

Scenario generation

Mutivariate copulas

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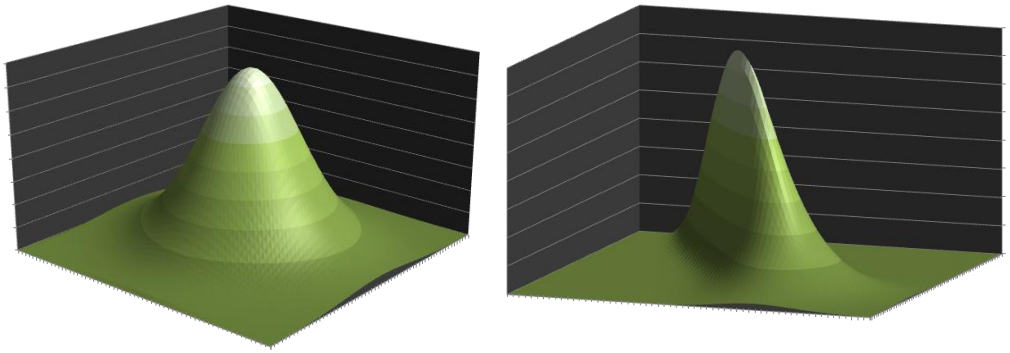
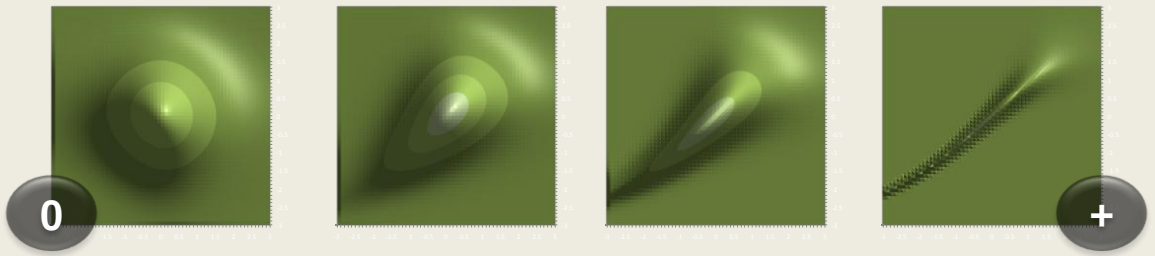
- Risk-Lab employs advanced Elliptical and Archimedean copulas to generate random scenarios from multi-variate hybrid distributions.
- Correlations are user-definable.
- Using a random seed, a simulation process may be executed multiple times obtaining the same results.



Bivariate copulas with low and high inter-variable correlation

Density of bivariate distributions with different correlation levels



Unprocessed data reporting

Simulation results

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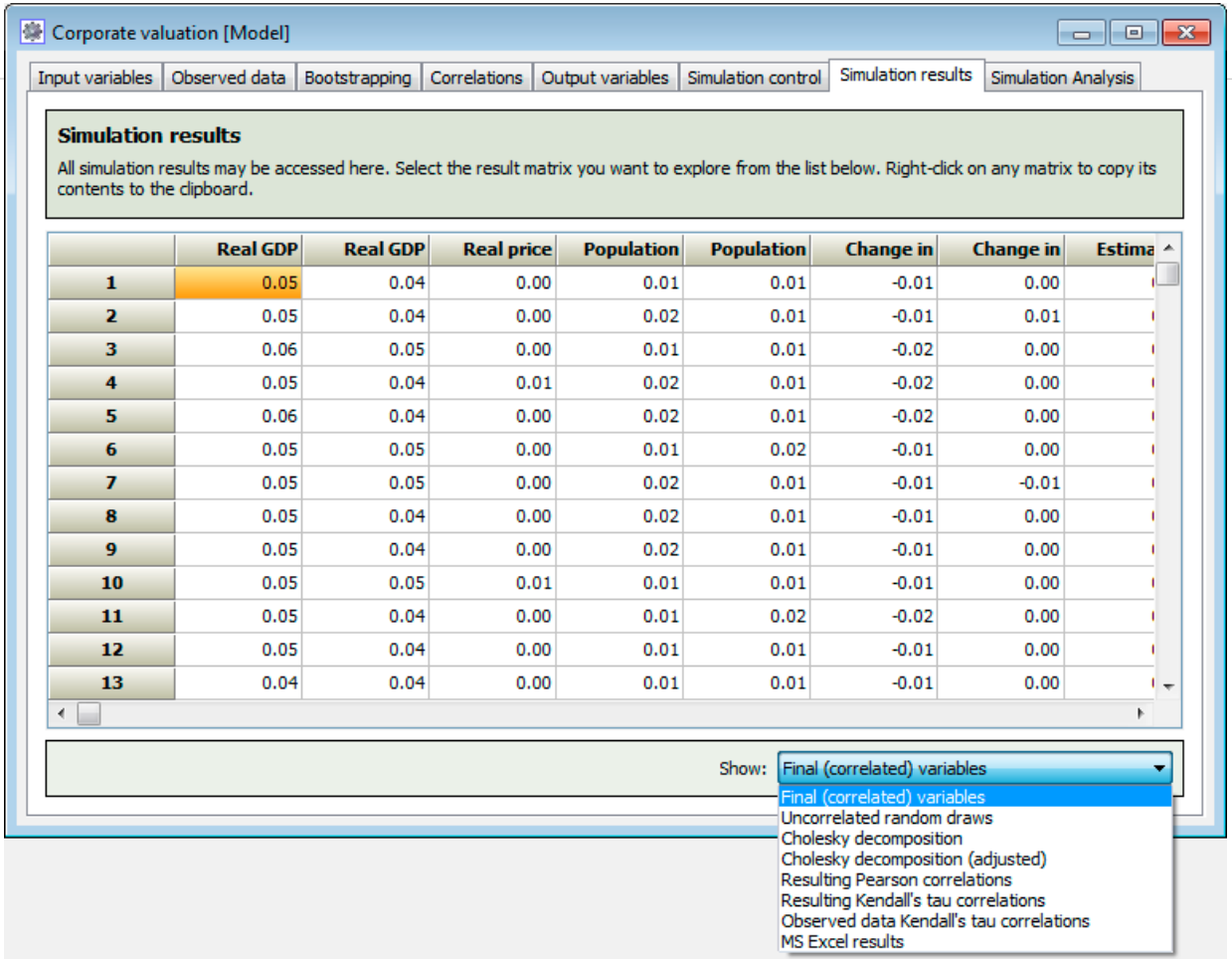

	Real GDP	Real GDP	Real price	Population	Population	Change in	Change in	Estima
1	0.05	0.04	0.00	0.01	0.01	-0.01	0.00	
2	0.05	0.04	0.00	0.02	0.01	-0.01	0.01	
3	0.06	0.05	0.00	0.01	0.01	-0.02	0.00	
4	0.05	0.04	0.01	0.02	0.01	-0.02	0.00	
5	0.06	0.04	0.00	0.02	0.01	-0.02	0.00	
6	0.05	0.05	0.00	0.01	0.02	-0.01	0.00	
7	0.05	0.05	0.00	0.02	0.01	-0.01	-0.01	
8	0.05	0.04	0.00	0.02	0.01	-0.01	0.00	
9	0.05	0.04	0.00	0.02	0.01	-0.01	0.00	
10	0.05	0.05	0.01	0.01	0.01	-0.01	0.00	
11	0.05	0.04	0.00	0.01	0.02	-0.02	0.00	
12	0.05	0.04	0.00	0.01	0.01	-0.01	0.00	
13	0.04	0.04	0.00	0.01	0.01	-0.01	0.00	

Risk-Lab presents detailed results for Monte-Carlo simulations. These raw results include:

- Correlated (final) random scenarios
- Non-correlated (initial) scenarios
- Cholesky decomposition
- Adjusted Cholesky decomposition
- Pearson correlations
- Kendall ‘s Tau observed correlations
- Kendall ‘s Tau resulting correlations
- Values of MS Excel result cells

Results analysis

Output distributions

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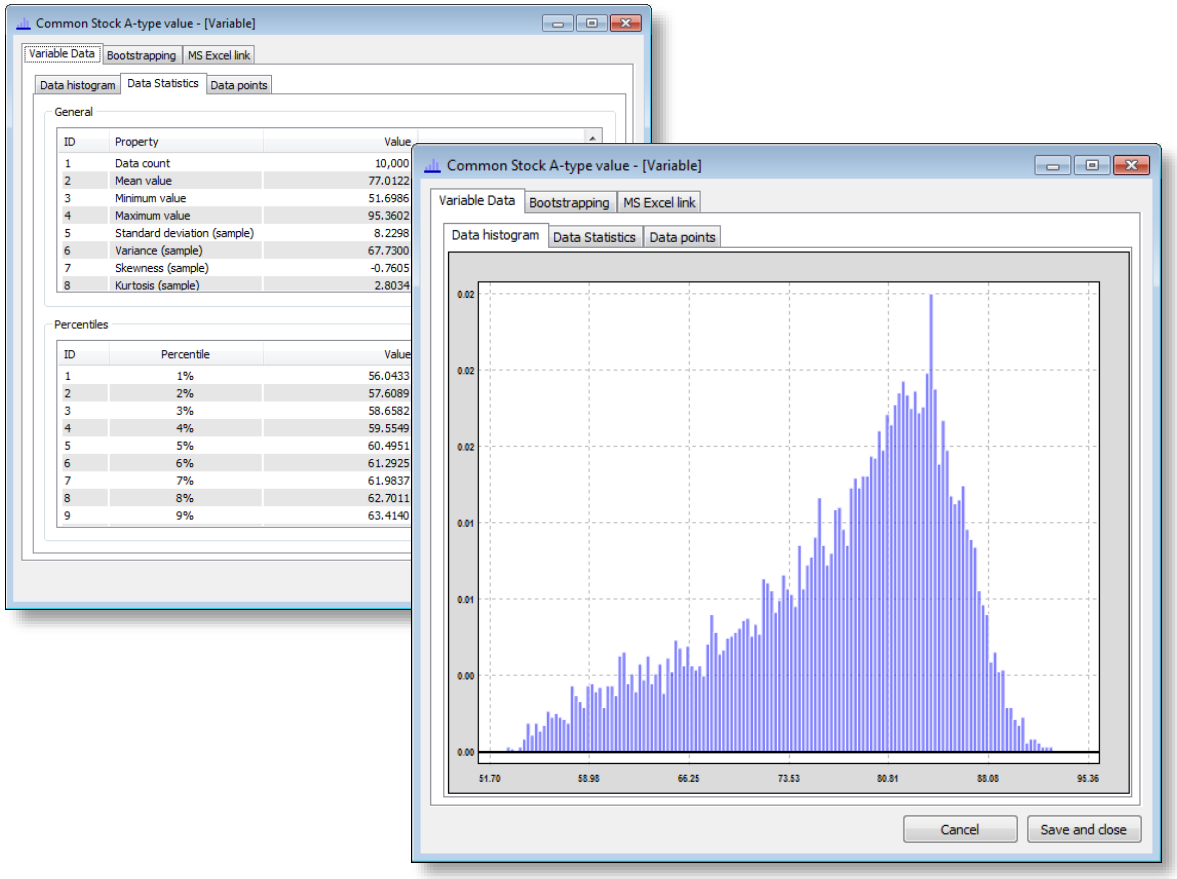

- Simulation results are summarized using histograms. Descriptive statistics for each variable are also displayed, including minimum, maximum, mean, variance, skewness, kurtosis, percentiles, and the probability of being negative.

Results analysis

Stress scenarios

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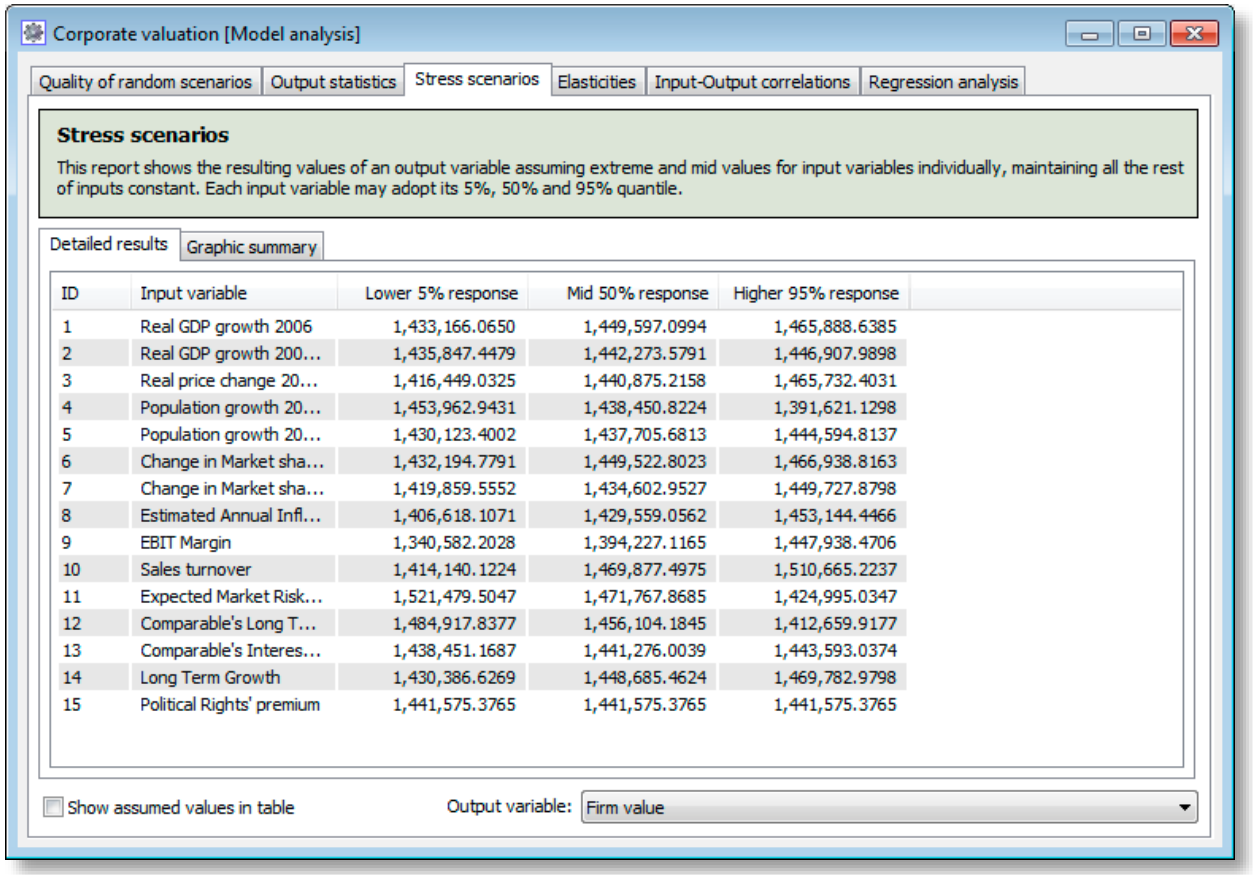

ID	Input variable	Lower 5% response	Mid 50% response	Higher 95% response
1	Real GDP growth 2006	1,433,166.0650	1,449,597.0994	1,465,888.6385
2	Real GDP growth 200...	1,435,847.4479	1,442,273.5791	1,446,907.9898
3	Real price change 20...	1,416,449.0325	1,440,875.2158	1,465,732.4031
4	Population growth 20...	1,453,962.9431	1,438,450.8224	1,391,621.1298
5	Population growth 20...	1,430,123.4002	1,437,705.6813	1,444,594.8137
6	Change in Market sha...	1,432,194.7791	1,449,522.8023	1,466,938.8163
7	Change in Market sha...	1,419,859.5552	1,434,602.9527	1,449,727.8798
8	Estimated Annual Infl...	1,406,618.1071	1,429,559.0562	1,453,144.4466
9	EBIT Margin	1,340,582.2028	1,394,227.1165	1,447,938.4706
10	Sales turnover	1,414,140.1224	1,469,877.4975	1,510,665.2237
11	Expected Market Risk...	1,521,479.5047	1,471,767.8685	1,424,995.0347
12	Comparable's Long T...	1,484,917.8377	1,456,104.1845	1,412,659.9177
13	Comparable's Interes...	1,438,451.1687	1,441,276.0039	1,443,593.0374
14	Long Term Growth	1,430,386.6269	1,448,685.4624	1,469,782.9798
15	Political Rights' premium	1,441,575.3765	1,441,575.3765	1,441,575.3765

- **As part of the stress-testing phase, the system automatically evaluates extreme scenarios for each of the input variables and calculates their impact on result variables.**

Results analysis

Input/output elasticities

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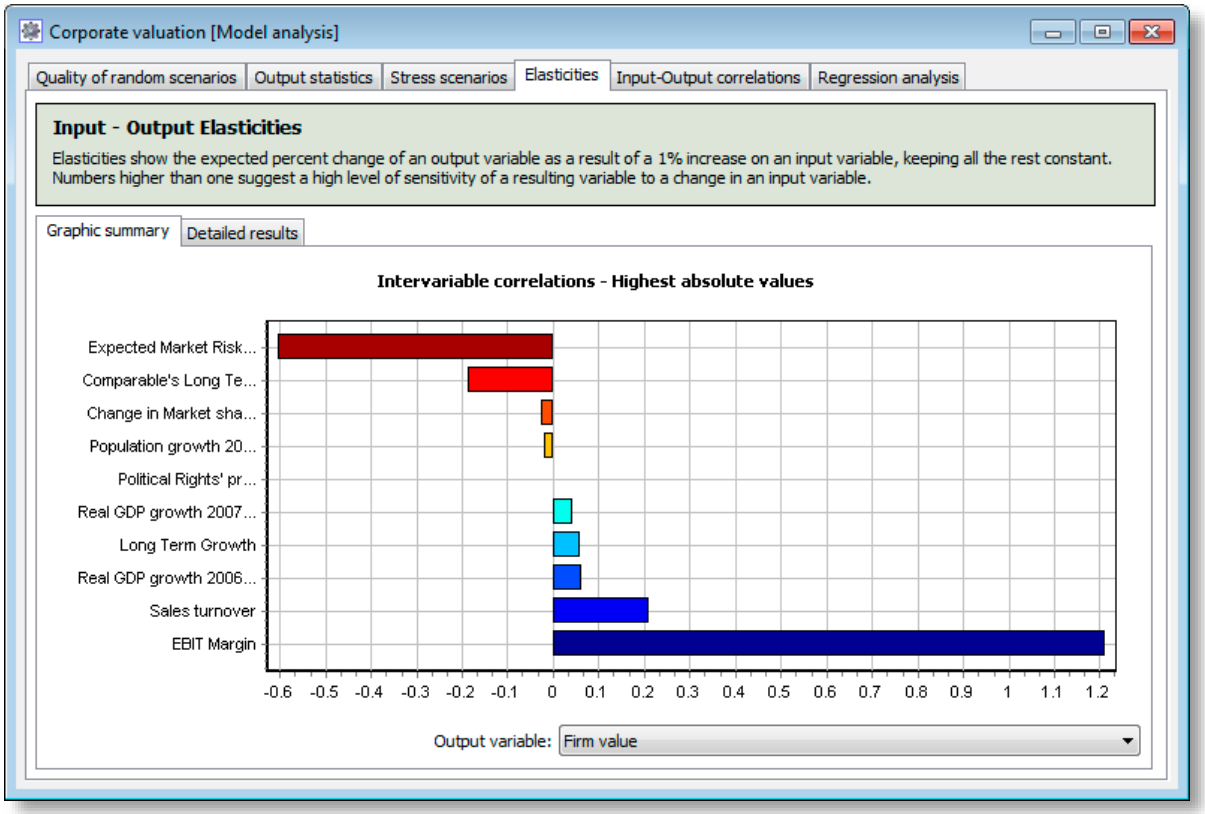

- Elasticities show the proportional impact that a 1% variation in input variables produces on output variables.
- Risk-Lab presents a ranking of all elasticities related to a selected output variable, allowing a quick identification of the key instruments that may alter results.

Results analysis

Multivariate regression

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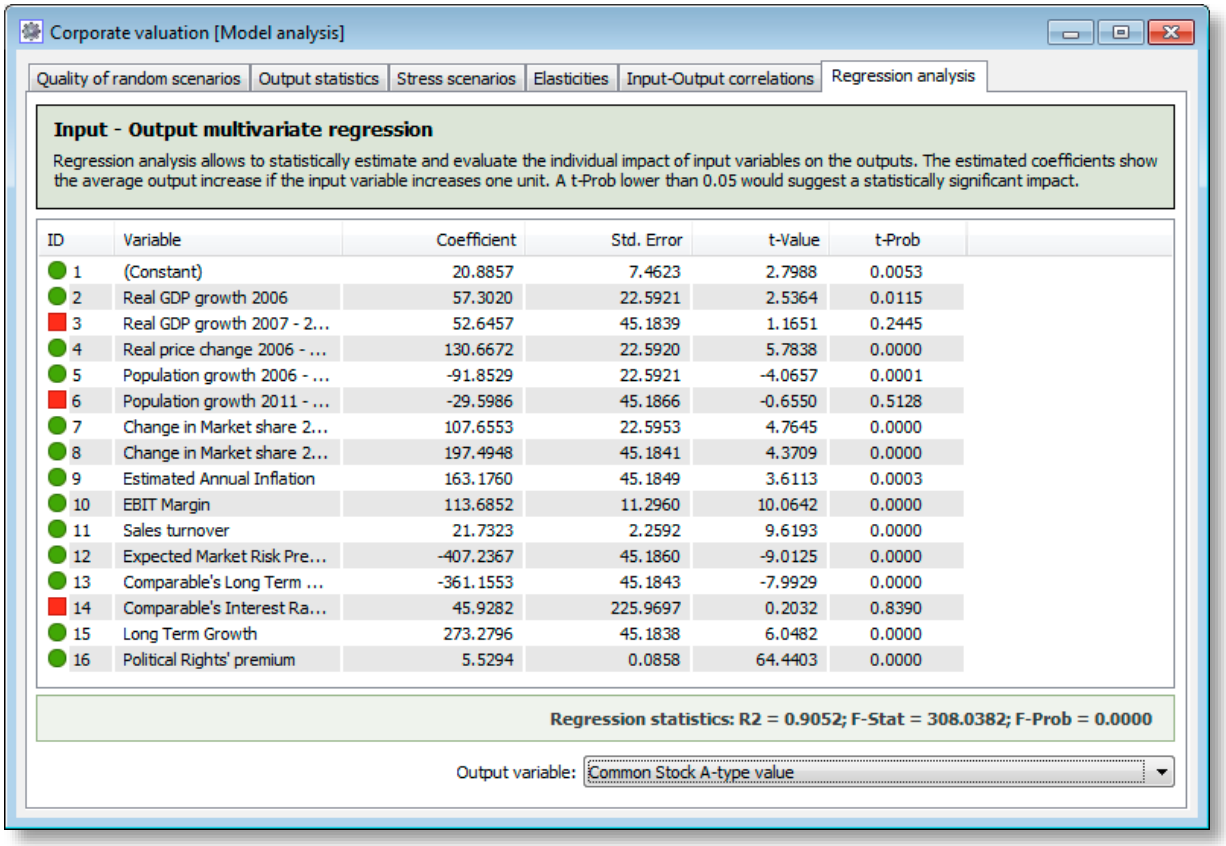

ID	Variable	Coefficient	Std. Error	t-Value	t-Prob
1	(Constant)	20.8857	7.4623	2.7988	0.0053
2	Real GDP growth 2006	57.3020	22.5921	2.5364	0.0115
3	Real GDP growth 2007 - 2...	52.6457	45.1839	1.1651	0.2445
4	Real price change 2006 - ...	130.6672	22.5920	5.7838	0.0000
5	Population growth 2006 - ...	-91.8529	22.5921	-4.0657	0.0001
6	Population growth 2011 - ...	-29.5986	45.1866	-0.6550	0.5128
7	Change in Market share 2...	107.6553	22.5953	4.7645	0.0000
8	Change in Market share 2...	197.4948	45.1841	4.3709	0.0000
9	Estimated Annual Inflation	163.1760	45.1849	3.6113	0.0003
10	EBIT Margin	113.6852	11.2960	10.0642	0.0000
11	Sales turnover	21.7323	2.2592	9.6193	0.0000
12	Expected Market Risk Pre...	-407.2367	45.1860	-9.0125	0.0000
13	Comparable's Long Term ...	-361.1553	45.1843	-7.9929	0.0000
14	Comparable's Interest Ra...	45.9282	225.9697	0.2032	0.8390
15	Long Term Growth	273.2796	45.1838	6.0482	0.0000
16	Political Rights' premium	5.5294	0.0858	64.4403	0.0000

- Mutivariate regression analysis makes it possible to indentify the marginal impact of each input variable on outputs once the effect of all the rest of variables is simultaneously considered.
- Risk-Lab also presents indicators that help to assess the statistical relevance of individual impacts.
- Employing easy-to-read flags, the program classifies variables according to their statistical significance.

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Main applications

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Finance

- Capital budgeting
- Derivatives valuation
- Corporate valuation
- Value-at-Risk calculation

Operations

- Critical route analysis in project management
- *Six Sigma* evaluation
- Decision-tree analysis

Marketing

- Sensitivity analysis of sales forecasts

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Contact information

Risk-Lab

By eMail	mail@risk-o.com
By phone	+1-800-573-7475 +1-800-573-RISK