

F-205 Monte Carlo Simulation for Risk Analysis & Project Finance



Course Description

The diversity, complexity and particularity of mega-infrastructure projects—including PPPs—require increasingly greater knowledge in risk analysis and project finance. This course aims to strengthen the capability of the financial analyst to accurately carry out a risk analysis and project finance evaluation. The specialized literature illustrates how the Monte Carlo method can effectively evaluate the investment risk of PPP projects, and help investors make better decisions.

The objective of this course is to provide participants with a knowledge of key issues involved in the Monte Carlo (MC) simulation for risk analysis and project finance. Participants will learn to carry-out multiple tests and define potential investment results, calculate risk in the varying stages of infrastructure projects, and quantify the value for money. The allocation of probability distributions to the assumption variables allows predicting and understanding risk exposures and how to mitigate them, while preparing participants to tackle risk according to the policy of each country.

Currently, public financial authorities in charge of carrying out risk analysis and/or monitoring fiscal risks use Monte Carlo simulation when dealing with retained risk in PPPs, or when forming a contingency plan.

Learning Objectives

Through successful completion of this course, participants will be able to:

- Create simulation models in Microsoft Excel® and perform simulations with Oracle Crystal Ball®
- Improve the management of uncertainty with a view to increasing competitiveness, reducing costs and increasing efficiency and profitability
- Make forecast projections based on historical records
- Incorporate the use of prediction and optimization models with the Predictor and OptQuest modules of Oracle Crystal Ball®
- Export results and data to other applications, with a view to preparing reports or presentations for management.
- Generate statistical reports, scenarios, sensitivity, eventual or random events
- Perform statistical analysis of risks and business finances
- Employ practical applications of Oracle Crystal Ball® in project management

Who Will Benefit

- Government officials and other professionals involved in risk analysis and project financing
- National, regional and local government officials (officials from ministries of energy, public works, infrastructure, water, education, health, economy, and finance, and/or PPP/ privatization units of such ministries)

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Charts and Graphs

- Frequency distributions
- Quantitative data graphs
- Scatter plots

Measures of Central Tendency

- Position
- Centralization
- Dispersion
- Shape

Behavior of the Data

- Covariance
- Correlation

Probability Distribution

- Probability distribution functions
- Cumulative distribution functions
- The uniform distribution
- The normal distribution
- Chebyshev's theorem
- The lognormal distribution
- The triangular distribution
- The Beta PERT distribution

Statistical Inference

- Confidence intervals
- Law of large numbers
- Central limit theorem
- Monte Carlo method
- Bootstrap method

Stochastic Model for Public-Private Partnership

- Random variable
- Geometric Brownian motion
- Geometric Brownian motion adjusted for risk

First Steps in the Use of Crystal Ball®

- The Crystal Ball® toolbar
- Gallery of distributions
- Definition of assumptions, forecasting and execution parameters
- Execution and first forecast graphics
- Analysis of results for decision making

Expanding the Graphic Results and Reports

- Forecast graphics
- Graphs of assumptions and correlations
- Overlapping graphics
- Trend charts
- Sensitivity graphics
- Basic and personalized reports
- Extraction and export of data

Simulation with Crystal Ball®

- How to run and apply a Monte Carlo simulation model
- Definition of assumptions
- Data entry
- Determination of the probability distribution
- Defining the forecast alternatives
- Generation of graphic results
- Analysis and decision making
- Introduction to sensitivity analysis
- Exporting results and data to other applications
- Control of the simulation for subsequent monitoring
- Correlation between variables

Financial Decision-Making

- Analysis and selection of investments
- Investment selection methods

Crystal Ball® Complementary Tools

- Theory about time series
- Considerations to make a correct prediction
- Input parameters with one, two or more independent variables
- Using the CB-Predictor module wizard
- Option Quest
- Definition, selection of decision variables, parameters and analysis
- Use of the CB-OPTQUEST module assistant

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IP3's PPP and Project Finance Specialist Certification programs provide core bodies of knowledge in project finance and PPPs, creating a world-class standard in PPP and project finance development.

Certification requirements include 24 CEUs and successful completion of a Specialist exam.

IP3 is an accredited provider of Continuing Education Units (CEUs) as sponsored by the International Association for Continuing Education and Training (IACET).



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