Advanced Project Finance Modelling Addressing Circular References and Complex Sculpting

The digital course on advanced project finance modelling is and advanced course that is divided into separate modules that will allow you to move your project financial modelling skills to a new level. The course is designed to be both practical and advanced. You can survey the subjects in the outline below and select particular modules that are applicable to problems that you may be facing now or that you probably experience in the future. Some of the distinct subjects you can address in the different modules include: (1) how to resolve circular references in models using user defined functions; (2) how to apply automated sculpting and financing routines in your project finance models; (3) how to evaluate and resolve sculpting with multiple issues with different tenures and/or interest rates; (4) how to compute sculpting where the debt size is given by the debt to capital ratio and a minimum DSCR is defined; (5) how to incorporate re-financing issues with sculpting and income taxes.

The on-line course will be structured so that the subjects are independent from each other. If you want, you can select different modules without selecting all of the modules. Separate course segments will include focused exercises as well as examples of how the advanced module works in actual modelling situations. Before each course segment, files will be distributed to each participant and optional practice exercises will be available. The course with leave you with practical solutions to the different practical project finance problems.

Teaching Approach/Objectives

Using a number of intensive hands-on exercises and case studies, participants work through the theory and application of project finance modelling issues that are difficult to solve without sophisticated VBA and functions. After introducing programming techniques that can address various problems in project finance, participants apply the techniques in a real-world context. A series of project finance models and other applications will be used to demonstrate how the efficiency of excel can be dramatically improved through using user defined functions; through creating VBA macros; through applying dynamic tables; and through learning new presentation techniques. A vast library of case studies, financial models, excel tools for financial analysis and other information is provided to participants. The course is intended to be practical and inter-active, with delegates encouraged to ask questions.

Module 1: Solving Circular References with User Defined Functions

1. Why Circular References Exist in Project Finance Models
    a. Interest and Fees During Construction
    b. Cash Sweeps in Project Finance Models
    c. Debt Sculpting with Taxes
    d. DSRA Account
    e. Sculpting with Multiple Issues
    f. Exercises Illustrating Each Case

2. Conventional Methods to Solve Circular Reference
    a. Problems with the Iteration Button
    b. Weak Solution from Re-Pasting Formulas
    c. Solution from Copy and Paste Macro with Iterations
    d. Presentation of iterations and structuring circular reference resolution

3. Creating User-Functions to Solve Circular Reference Problems
    a. Solving a Basic Problem with Fees
    b. Notion of Replicating Formulas
    c. Creating a Parallel Model and Starting at the End
    d. Applying Iteration Routines to User Defined Functions
    e. Solving Problem of Cash Sweep in Annual Project Finance Model
    f. Solving Problem of Sculpting with Taxes, NOL and Fees
    g. Solving IDC and Fees Problem with Loop
    h. UDF for mortgage repayment with changing interest rates

Module 2: Applying User-Defined Functions to Solve Problems in Comprehensive Project Finance Models (In Contrast to and with Copy and Paste Routines)

1. Illustration of Applying UDF to Complete Project Finance Models with Sculpting and Funding Circular Reference
    a. Introduction and learning how to create more complex UDF's
    b. Solar Example with Multiple Debt Issues and Alternative Debt Sizing Constraints
    c. Wind Case with Alternative Debt Sizing from P50 and P99 as Well as Debt to Capital
    d. Re-Financing Case with Debt Sizing from DSCR with Taxes
    e. Sculpting with Curved DSCR and Maximum Debt to Capital Constraint

2. Applying Template User Defined Function to Model with Copy and Paste
    a. Thinking of UDF Function Like Other Functions in Excel
    b. Potential Necessity to Create Master Timeline in Model
    c. Copying Function to Your Model
    d. Understanding Function in Model
    e. Extracting Variables Necessary for Function
    f. Implementing Parallel Model Next to Copy and Paste Solution
    g. UDF solution to P50 and P90 Debt Sizing Problem

3. Modifying User Defined Function for Specific Issues
    a. Understanding Comprehensive User Defined Function with Public Variables
    b. Adding New Variable to Program with Spare
    c. Including Equation for New Problem in a Function
    d. Including Result of Equation in Output

Module 3: Problem of Multiple Sculpted Debt Issues with Different Interest Rates and Tenures

1. Introduction to Sculpting with Multiple Issues
    a. Review of Term Sheet with Different Debt Issues
    b. Illustration of Model with Multiple Sculpted Debt Issues
    c. Fundamental Equation for Sculpting with Multiple Debt Issues
    d. Simple Method when One Issue is Sculpted and Others are Non-Sculpted
    e. Why Simple Allocation Does Not Work for Multiple Sculpted Issues

2. Working Through Curved DSCR Example
    a. Framework of Problem with Aggregate Debt Sculpting, Capture and Non-Capture and Debt IRR
    b. Computation of Aggregate Debt Sculpting
    c. Segregation of Capture Debt Issue and Non-Debt Issue with Debt Tenure
    d. Computation of Non-Capture Sculpting with LLCR Method
    e. Aggregate Non-Capture Issues and Remaining Cash Flow for Sculpting
    f. Computation of Capture Issue with Sculpting NPV Formula
    g. Aggregate Debt Service and Calculation of Debt IRR
    h. Resolving Circular Reference from Debt IRR

3. Analysis of with Multiple Debt Issues
    a. Illustration of User Defined Function for Multiple Debt Issues
    b. Applying Multiple Debt Sculpting in UDF Template
    c. Effects of Different Debt Structures on Average Debt Life
    d. Complications from Withholding Tax, Political Risk Insurance and On-Going Fees
    e. Balloon Payments as Multiple Debt Sculpting Problem

Module 4: Sculpting with Debt Sizing from Maximum Debt to Capital and Sculpting from Minimum DSCR

1. Introduction to Sculpting with Multiple Issues
    a. Review of Term Sheet with Maximum Debt to Capital and Minimum DSCR
    b. Use of LLCR to Compute Flat DSCR with Maximum Debt to Capital Constraint
    c. Constraint from Average Debt Life with Minimum DSCR
    d. Illustration of Equity IRR Effects of Curved DSCR

2. Working Through Curved DSCR Example
    a. Adjustments to LLCR Method with LLCR Factor Greater than 1.0
    b. Application of Interpolate Function to Create Curved DSCR
    c. Use of Goal Seek Function to Constrain Debt Size
    d. Creating Tables with Alternative LLCR Factors and Debt Size
    e. Using VBA for Data Table with LLCR Factor and Average Life
    f. Finding Optimal DSCR Curve with Average Life Constraint
    g. Selecting the Optimal DSCR Curve from Sensitivity Table
    h. Computing Equity IRR with Alternative DSCR and Average Life Constraints

3. Use of VBA with Spinner Boxes to Create Flexible Sensitivity
    a. Example of Models with Flexible Scenario and Sensitivity Analysis
    b. Problems with Linking Inputs without VBA
    c. Use of Copy with VALUE to Efficiently Create Flexible Scenario/Sensitivity Analysis
    d. Creating Effective and Flexible Presentation of Scenario/Sensitivity Analysis

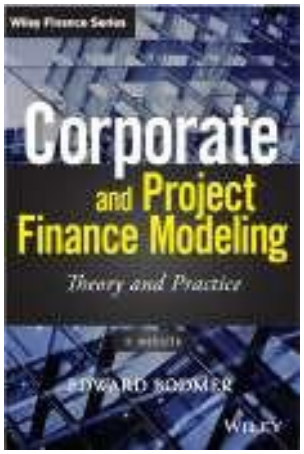
Module 5: Sculpting and Re-Financing in the Context of Income Taxes

1. Re-financing and Sculpting Introduction
    a. Illustration of Re-financing Case with No Taxes
    b. Setting-up Models for Flexible Re-financing
    c. Term Sheet for Re-financing
    d. Unwinding Swaps and Re-financing
    e. Understanding Potential for Re-financing

2. Problem of Re-financing Interest and Taxes
    a. Reasons for Circular Reference
    b. Alternative DSCR Assumed for Re-Financing
    c. Creating Flexible User Defined Function for Re-financing
    d. Problem of Taxes after Re-financing and Computing Initial Sculpting
    e. Presenting Re-financing in Models

3. Other Advanced Project Finance Modelling Issues
    a. Flexible Payment Functions with Changing Interest Rate
    b. Dynamic Goal Seek with Level Debt Service
    c. Effective Presentation and Scenario Analysis
    d. Changes in DSRA as Part of DSRA
    e. Flexible Project Cost Definition with Shareholder Loan, EBL and Mezzanine Debt
    f. Computation of LLCR with Multiple Debt Issues

Faculty: Edward Bodmer



Edward Bodmer provides financial and economic consulting services to a variety of clients, he teaches professional development courses in an assortment of modelling topics (project finance, M&A, and energy). He is passionate about teaching in Africa, South America, Asia and Europe. Many of the unique analytical concepts and modelling techniques he has developed have arisen from discussion with participants in his courses. Professor Bodmer has taught customized courses for MIT's Sloan Business School, Bank Paribas, Shell Oil, Society General, General Electric, HSBC, GDF Suez, Citibank, CIMB, Lind Lakers, HSBC, Saudi Aramco and many other energy and industrial clients. Bodmer's consulting activities include developing complex project finance, corporate and simulation models, providing expert testimony on financial and economic issues before energy regulatory agencies, and advisory services to support merger and acquisition projects.

Mr Bodmer has written a textbook titled ***Corporate and Project Finance Modelling, Theory and Practice*** published by Wiley Finance. The book introduces unique modelling techniques that address many complex issues that are not typically used by even the most experienced financial analysts. For example, it describes how to build user-defined functions to solve circular logic without cumbersome copy and paste macros; how to write function that derives the ratio of EV/EBITDA accounting for asset life, historical growth, taxes, return on investment, and cost of capital; and how to efficiently solve many project finance issues related to debt structuring. Bodmer is in the process of writing a second book that describes a series of valuation and analytical mistakes made in finance. This book uses many case studies from Harvard Business School that were thought to represent effective business strategies and later turned into valuation nightmares.

Over the course of his career Professor Bodmer has been involved in formulating significant government policy related to electricity deregulation; he has prepared models and analyses for many clients around the world; he has evaluated energy purchasing decisions for many corporations; and, he has provided advice on corporate strategy. Mr Bodmer's projects include development of a biomass plant, analysis and advisory work for purchase of electricity generation, distribution and transmission assets by the City of Chicago, formulation of rate policy for major metro systems and street lighting networks, advocacy testimony on behalf of low income consumers, risk analysis for toll roads, and evaluation of solar and wind projects. He has constructed many advisory analyses for project finance and merger and acquisition transactions.

Professor Bodmer was formerly Vice President at the First National Bank of Chicago where he directed analysis of energy loans and also created financial modelling techniques used in advisory projects. He received an MBA specializing in econometrics (with honours) from the University of Chicago and a BSc in Finance from the University of Illinois (with highest university honours). Mr Bodmer was born in Manchester, England, he lived in Switzerland as a child, and currently resides in Chicago. You can find more information on his website www.edbodmer.com.