
Introduction to Four Stage Course Outline

This is the first outline in a series of four outlines. The intention of this four part outline is to have course content that will have an extensive coverage and that will benefit both beginners and experienced participants. The four parts each of which will be held for a week include the following, the first of which is covered in this document.

1. Fundamentals of financial analysis for private and government projects and key ideas of using financial models.

2. Detailed Modelled Timing, Risk Analysis in Models and using financial models to evaluate different projects and compare the benefits of private versus public projects – computing value of money and EIRR using different techniques.

3. Detailed debt structuring and cost of capital issues associated with financial analysis of public/private partnership models.

4. Complex aspects of constructing and interpreting financial models including structuring subsidies and viability gaps in an efficient manner.

This four part structure recognizes that there is the need for concept and background knowledge of Project Finance, PPP as well as excel before a beginner can really appreciate the modelling application. The first stage of the course therefore focuses on this excel and finance background. All of the modules will include pre-course work on excel through watching videos and pre-course reading. For the first module, there are three videos. The first is on short-cut keys and use of generic macros. The second is on setting-up a spreadsheet and the third is on the basic structure of a project finance model.

Template Models Developed During the Course

At the end of the four stage program the ministry will have a template for developing a financial model and a template to guide Government official to build financial model and review financial models. There will be two templates:

a. Excel template for developing a financial model
b. Excel template to guide Government official to review models.

In addition to the template models, excel learning aids will be documented and developed during the course. A table will be provided that shows the functions that applies mostly in only financial model. In addition there will be table of short-cuts to improve excel efficiency. Finally, macros may be helpful or necessary in project modelling. Macros will be understood and provided instead one having to learn how to write macros and learn detail of VBA programming.
Case Studies for Stage 1

Case studies over the four stage course will be from two projects in Ghana. The first will be from a simple PPP market project. The second will be a mega project like the Port and railway project. The two case studies will help participants to understand how to develop a financial model and how to assess financial models for such project. The ministry will share the project documents to produce course work papers. The first stage will concentrate on the simple PPP market project.

To assure that the concepts in the course are retained there will be extensive group work in the class where participants work independently to create model concepts. There is this basic simple financial model at my web site. We will go through at the beginning stage even before simple case study for the market.

Outline for Stage 1 of Course: Project Finance Theory and Model

1. Working Through Basic, Simple Example (Included on Website)
   a. Definition of Fundamental Terms
   b. Definition of Key Outputs
   c. Short-cuts for Efficient Formulas
   d. Understanding Cash Flow and Income Statement
   e. Completion of Model Selected Formulas on Independent Basis in Groups

2. Theory on the Fundamentals of Project finance and details on use of excel tool for financial modelling
   a. Key accounting and finance terms and concepts used in financial models
      i. Capital Expenditures
      ii. Uses of Funds
      iii. Sources of Funds
      iv. Revenues and Expenses
      v. EBITDA
      vi. Free Cash Flow
      vii. Cash Flow Available for Debt Service
      viii. Debt Service
      ix. Equity Cash Flow
   b. Key Project Finance Terms
      i. SPV
      ii. Non-Recourse
      iii. Capital Intensity
      iv. Project Phases: Financial Close, Notice to Proceed, Completion Test
      v. Project Contracts
      vi. History of Project Finance
      vii. Discussion of Eurotunnel Case Study and problems with non-PPP structure
   c. Project IRR, Debt IRR, Equity IRR
Basic Short-cut for Copying to Right
ii. Definition of IRR
iii. Participant Case Exercise on Computing Project IRR
iv. Definition of Debt IRR
v. Participant Case Exercise on Computing Debt IRR
vi. Project Cash Flow and Debt Cash Flow for Equity Cash Flow
vii. Computation of Project IRR, Debt IRR and Equity IRR for simple PPP Ghana case study

3. Practical on the use of Short cut and their definitions in excel
   a. Good and Bad Practices for Developing Spreadsheets
      i. Keeping Inputs in One Place
      ii. Same Formulas Across Columns
      iii. Keeping Formulas Simple
      iv. Setting up Columns of Spreadsheet
      v. Excel Short-cut Keys for Efficient Modelling
      vi. Use of Generic Macro File for Added Short-cuts
      vii. Creating Short-Cut Keys
      viii. Participant Exercise in using short-cut keys to set-up keys for model

4. Project Finance Model Structure
   a. Importance of time periods in project finance and time-line in project finance model
   b. Structure of thinking in project finance with operating analysis (project IRR) separate from debt and equity analysis. Idea of input sheet and calculation sheet.
   c. Understanding cash flow statement and sources and uses statement
   d. Analysing the key input variables to an infrastructure financing spreadsheet
   e. Integrating and linking key financial statements including the profit and loss, balance sheet, and cash flow waterfall in a financial model
   f. Participants review model from simple case.

5. Project Finance Model Timing – Annual Model
   a. Flexible Timing in Project Finance Models
   b. Review of actual models and date inputs and timing
   c. Modelling project phases with switches and timing switches
   d. Participant Exercise in Creating Time-Line (Participants give dates and timing of construction, concession and operation. Work in groups to develop time line independently).

6. Project Finance Operating Analysis
   a. Setting-up operating assumptions for revenues, operating expenses and capital expenditures
   b. Alternative methods for presenting time series assumptions
   c. Modelling inflation rates and growth rates with different time periods
   d. Modelling complex items such as periodic maintenance from hours of runtime
   e. Calculation of pre-tax IRR and construction of summary page
   f. Calculation of contract price from required pre-tax IRR
   g. Participants use Goal Seek to compute IRR
   h. Participants compute Project IRR for simple PPP market case.

7. Depreciation and Tax Analysis
   a. Notion of structured models with separate page for depreciation analysis
b. Use of timing switches for depreciation and/or capital allowance

c. Introduction to verification and auditing for testing balances

d. Benefits of separating depreciation on interest during construction and fees from other depreciation and amortization

e. Calculation of after-tax project IRR

8. **Financing Analysis**

   a. Debt Structure Inputs
   
   b. Including Sources and Uses
   
   c. Computing Debt Schedule
   
   d. Cash Flow Waterfall
   
   e. Equity IRR
   
   f. Review of Equity IRR in Simple Case
Stage 2 – Detailed Timing, Risk Analysis in Models and using financial models to evaluate different projects and compare the benefits of private versus public projects – computing value of money and EIRR using different techniques

Stage 2 in Context of Four Stage Course Outline

This is the second outline in a series of four outlines. The second stage follows from the first stage and adds more complex timing as well as risk analysis. In this stage the evaluation of value for money and economic IRR is discussed in detail. The value for money and bid evaluation is addressed in parts as follows: (1) during feasibility stage to compare whether to opt for traditional method or PPP in that case we do not call for Bid (i.e. comparing the outcome of the feasibility results with that of the potential government); and (2) after the Bid how to compare the bidders proposal with that of the government.

1. Fundamentals of financial analysis for private and government projects and key ideas of using financial models

2. Detailed Timing, Risk Analysis in Models and using financial models to evaluate different projects and compare the benefits of private versus public projects – computing value of money and EIRR using different techniques

3. Detailed debt structuring and cost of capital issues associated with financial analysis of public/private partnership models.

4. Complex aspects of constructing and interpreting financial models including structuring subsidies and viability gaps in an efficient manner.

This outline for stage 2 expands on the basic project finance model to include detailed timing elements and risk analysis. The risk analysis is the foundation for evaluating value for money and EIRR. As with the first stage there will be optional pre-course work. For the second stage this involves watching videos and detailed project finance modelling and constructing value for money analysis.

In the second stage the template for developing a financial model and the template to guide Government officials for building financial model and reviewing financial models will be developed. At the end of the four stage course there will be two templates:

   a. Excel template for developing a financial model
   b. Excel template to guide Government official to review models.

Case Studies for Stage 2

In stage 2 of the course the mega project like the Port and railway project will be reviewed. The case will be used to help participants to understand how to develop a financial model and how to
assess financial models. The ministry will share the project documents for the mega project to produce course work papers.

Outline for Stage 2 of Course: Detailed Timing, Risk Analysis in Models and using financial models to evaluate different projects and compare the benefits of private versus public projects – computing value of money and EIRR using different techniques

1. Details of Timing in Comprehensive Project Finance Model
   a. Including alternative time periods for different periods
   b. Reasons for changing timing
   c. Modelling delay risk and flexible construction periods and S-curves
   d. Conversion of periodic data into annual and semi-annual presentations
   e. Review of timing assumptions in financial model of mega project in Ghana

2. Adjustments to Revenues and Expense with Detailed Timing
   a. Changing assumptions for detailed timing on contracts
   b. Incorporating maintenance for life cycle costs such as re-surfacing
   c. Detailed inflation and growth rate scenarios
   d. Review of operating expenses and revenues in mega project

3. Other Adjustments to Depreciation, Taxes and Debt
   a. Review annual model and understand similar structure for adjustments for annual model
   b. Compute periodic interest rate and repayment with flexible timing analysis
   c. Compute Equity IRR with the XIRR function

4. Risk Analysis in Model
   a. Importance of risk analysis
   b. Alternative methods for development of risk analysis including sensitivity analysis, scenario analysis, tornado diagrams and Monte Carlo Simulation.
   c. Review of scenario analysis in other models

5. Incorporation of Sensitivity Analysis in Model
   a. Introduction to Developer Tab and User Forms
   b. Sensitivity analysis with spinner buttons
   c. Sensitivity analysis with drop down boxes
   d. Re-set of Sensitivity Cases with Macro
   e. Participants add spinner box to model in mega case

6. Risk Analysis with Scenario Analysis
   a. Use of scenario code number
   b. Importance of INDEX or CHOOSE function in scenario and risk analysis
   c. Linking inputs to the used scenario
   d. Use of Data Table to summarize scenarios

7. Financial Model for Public Sector Comparator
   a. Definition of public sector comparator
   b. Differences between modelling from a public sector and a private perspective
   c. Construction risks
   d. Operation and maintenance risks
e. Output risks
f. Debt Cost
g. Debt Percentage
h. Modification to model with public sector perspective
i. Risk analysis from public sector perspective

8. Analysis of Models in Project Finance with Public Sector Perspective – Pre Bid
   a. Discussion of value for money (VfM) analysis that consists of a comparison of total costs of financing and delivering an infrastructure project by traditional government means versus private sector means.
   b. Compare VfM in Europe, U.K, Canada and U.S.
   c. Carrying out this transparent “cost comparator” to understand how to make an informed, long-term decision as to whether the project is viable or not, and if so, whether the government or the private sector should finance it.
   d. Analysing the overall strategic planning requirements for identifying and screening PPP project opportunities
   e. Participant case on how to calculate and analyse cost input variables for evaluating how to forecast financing costs and discount rates for both traditional (government) and private sector and capital market financing
   f. How to analyse, value and manage retained public sector risks and contingent liabilities in long-term PPP projects

9. Evaluation of Competing Projects – Post Bid
   a. Using consumer cost to evaluate bid
   b. Using net present value to evaluate bids
   c. Alternative structure of bids with different consumer risks
   d. Adjusting net present value with different timing
   e. Cost of availability to consumers
   f. Importance of consumer discount rate in computing net present value
   g. Risks of abandonment and re-negotiation

10. Participant Case with Value for Money, Calculation of Net Present Value and Public Sector Comparator
    a. Identifying the key factors driving value for money analysis: feasibility, affordability, sustainability and best value
    b. Does a viable public sector option exist?
    c. Designing the Public Sector Cost Comparison model
    d. Calculating the elements of base public costs: construction, whole-life maintenance, rehabilitation, insurance and risk premiums
    e. Estimating public sector financing costs and selecting the appropriate public discount rate
    f. Project Risk estimation: Using historic public risk data vs. estimates for public sector risk adjustments
    g. So-called “advanced” statistical techniques for analysing risk scenarios: understanding Monte Carlo Simulations
    h. Comparing Risk-Adjusted Public Sector Cost estimates with PPP

11. Assessment of Economic Rate of Return (EIRR) versus Financial Rate of Return
    a. Case Studies with examples of externalities not included in the Financial IRR calculation
b. Examples of potential externalities in various projects

c. Project contribution to GDP and economic growth, employment to local community, tax and foreign exchange.
Stage 3 - Detailed Debt Structuring and Cost of Capital Issues Associated With Financial Analysis of Public/Private Partnership Models

Stage 3 in Context of Four Stage Course Outline

This is the third outline in a series of four outlines. The third stage follows from the first two stages and addresses detailed debt and cost of capital issues. This section includes discussion of interest rate swaps and hedging of other macro-economic variables like foreign exchange. In this third stage, risks are incorporated into the cost of capital to further evaluate private versus public project.

1. Fundamentals of financial analysis for private and government projects and key ideas of using financial models

2. Detailed Modelled Timing, Risk Analysis in Models and using financial models to evaluate different projects and compare the benefits of private versus public projects – computing value of money and EIRR using different techniques

3. Detailed debt structuring and cost of capital issues associated with financial analysis of public/private partnership models.

4. Complex aspects of constructing and interpreting financial models including structuring subsidies and viability gaps in an efficient manner, re-financing and effective presentation of results.

This third outline expands on the project finance model to include detailed debt elements and understanding of the cost of capital. The IRR analysis is a key element in evaluating value for money and EIRR. As with the first two stages there will be optional pre-course work. For the third stage this involves watching videos and constructing debt structuring analysis.

In the third stage will continue the template to guide Government officials for building financial model and reviewing financial models.

Case Studies for Stage 3

In stage 3 of the course the mega project for the Port and railway project will be reviewed as well as the simple PPP market case. The two cases will be used to help participants to understand how to develop a financial model and how to assess financial models.

Outline for Stage 3 - Detailed Debt Structuring and Cost of Capital Issues Associated With Financial Analysis of Public/Private Partnership Models

1. Concepts of IRR and Risk
   a. Mathematics of IRR and implicit re-investment rate
b. Computation of Debt IRR for Loans  
c. Evaluation of IRR relative to Unitary Charges  
d. Participants Develop Goal Seek for Project IRR and Equity IRR for case study

2. Debt IRR analysis, Credit Spreads and Probability of Default  
   a. Review of default studies  
   b. Understanding Credit Spread and Credit Rating  
   c. Problems with Credit Spreads in Ghana  
   d. Changing Credit Spreads  

3. Equity IRR Requirements  
   a. Responsibility of Public Sector Evaluation of Equity IRR requirement  
   b. Theory of WACC and problems in application to PPP projects  
   c. Implied equity IRR requirements from Stock Price Analysis  
   d. Effect of equity IRR on efficient bidding for projects  
   e. Compute Equity IRR with the XIRR function  

4. Economic IRR  
   a. Review examples of economic IRR  
   b. Relationship between equity IRR and economic IRR.  
   c. Computation of economic IRR in case study  
   d. Use of economic IRR in assessing project benefits  

5. Alternative Debt Structuring in Model - Concepts  
   a. Five elements of debt structuring including debt sizing, debt funding, debt repayment, interest and fees, and credit enhancements  
   b. Review of term sheets from Ghana case study to understand debt terms  
   c. Input of debt structure in model from debt term sheet  

6. Debt Sizing in Model  
   a. Importance of debt sizing  
   b. Debt sizing from DSCR or Debt to Capital  
   c. Alternative methods of computing debt size from Goal Seek and sculpting formulas  
   d. Problems with circularity when use debt to capital ratio to size debt  

7. Debt Funding Analysis in Model  
   a. Alternative debt funding  
   b. Programming debt funding using equity first approach  
   c. Programming debt funding using pro-rata  
   d. Concept of bridge loans  
   e. Modelling projects that are completed in different stages  
   f. Modelling cash flow generated from earlier phases of project  

8. Debt Repayment Analysis in Model  
   a. Importance of debt repayment in computing equity IRR  
   b. Problems with debt tenor shorter than project life  
   c. Problems with cash flow pattern that quickly increases  
   d. Computation of repayment using level repayment  
   e. Computation of repayment using level debt service  
   f. Computation of repayment using sculpting  

9. Modelling of Credit Spreads, Fees and Base Rates  
   a. Combination of credit spreads and base rates to compute total interest rates
b. Incorporation of commitment fees and up-front fees in model
c. Use of LOOKUP function to evaluate changing credit spreads
d. Understanding accounting treatment of interest during construction, interest expense and amortisation of fees
e. Effect of accounting for interest and fees on project economics

10. **Interest Rate Swaps and Hedging**
   a. Reasons for hedging or not hedging interest rates and other potentially volatile economic variables
   b. Understanding of Swap rates and yield curves
   c. Computation of swap rates from yield curves in excel
   d. Review of data for swap rates and floating rates
   e. Hedging and volatility of other economic variables
   f. Natural hedging of selected economic variables

11. **Modelling and Understanding Credit Enhancements**
   a. Theory, modelling and impacts of Debt Service Reserve Account
   b. Theory, modelling and impacts of Maintenance Reserve Account
   c. Concept of dividend lock up covenant and modelling
   d. Concept of cash sweep and modelling of cash sweep

12. **Risk Assessment of Project Finance Model from Debt Perspective**
   a. Contrast of DSCR, LLCR and PLCR
   b. Requirements for DSCR, LLCR and PLCR in different ratios in different transactions
   c. Computation of LLCR and PLCR with changing interest rates
   d. Sensitivity and break-even analysis for DSCR, LLCR and PLCR
   e. Scenario analysis with DSCR, LLCR and PLCR
   f. Monte Carlo Simulation in risk analysis for debt
Stage 4 - Complex Aspects of Constructing And Interpreting Financial Models Including Structuring Subsidies and Viability Gaps in an Efficient Manner, Re-Financing and Effective Presentation of Results

Stage 4 in Context of Four Stage Course Outline

This is the final in a series of four outlines. The fourth stage follows from the earlier stages and addresses detailed debt and cost of capital issues. In this third stage, risks are incorporated into the cost of capital to further evaluate private versus public project.

1. Fundamentals of financial analysis for private and government projects and key ideas of using financial models

2. Detailed Modelled Timing, Risk Analysis in Models and using financial models to evaluate different projects and compare the benefits of private versus public projects – computing value of money and EIRR using different techniques

3. Detailed debt structuring and cost of capital issues associated with financial analysis of public/private partnership models.

4. Complex aspects of constructing and interpreting financial models including structuring subsidies and viability gaps in an efficient manner, re-financing and effective presentation of results.

This fourth outline expands on the project finance model to include analysis of viability gaps, subsidy payments, re-financing and other complex aspects of project finance models. In the final stage of the class, the template models for the ministry will be completed.

Case Studies for Stage 4

In stage 4 of the course the mega project for the Port and railway project will be used as the basis for the template model.

Outline for Stage 4 - Complex Aspects of Constructing And Interpreting Financial Models Including Structuring Subsidies and Viability Gaps in an Efficient Manner, Re-Financing and Effective Presentation of Results

1. Theory and Structure of Viability Gap and Subsidies
   a. Concept of Willingness to Pay
   b. Problems when Unitary Charge or Toll exceeds Willingness to Pay
   c. Economics of Measuring Willingness to Pay
   d. Cap on Project or Equity IRR with subsidy payments
   e. Review of Actual Traffic Studies and Value of Time

2. Modelling Alternative Viability Schemes
a. Payment During Construction
b. Funding Instruments
c. Repayments after Construction Completion
d. Effects of Alternative Schemes on the cost of capital and required IRR

3. Re-financing in PPP’s
   a. Economics of Re-financing
   b. Mechanics of Re-financing in Project Finance Models
   c. Reason Re-financing benefits occur in PPP projects
   d. Concept of Sharing Re-financing benefits
   e. Re-financing issues in Ghana and Africa

4. Circularity from Funding
   a. Problems for setting target debt to capital ratio
   b. Relationship between equity IRR and economic IRR.
   c. Computation of economic IRR in case study
   d. Use of economic IRR in assessing project benefits

5. Circularity from Debt Sculpting
   a. Five elements of debt structuring including debt sizing, debt funding, debt repayment, interest and fees, and credit enhancements
   b. Review of term sheets from Ghana case study to understand debt terms
   c. Input of debt structure in model from debt term sheet

6. Effective Dashboard in Template Model
   a. Items to present in summary page
   b. Methods of including sensitivity in summary page
   c. Presentation of alternative perspectives on dashboard
   d. Presenting effective and flexible graphs in the summary page

7. Scenario Tabulation in Template Model
   a. Adding a scenario tabulation to the template model
   b. Recording different scenarios and clearing scenarios with a macro
   c. Notion of adding scenario analysis to other models

8. Review of Other Models
   a. What to look for when opening a model
   b. Items that may not be included (e.g. project IRR)
   c. Reviewing assumptions
   d. Understanding operations analysis
   e. Evaluating debt assumptions
   f. Graphing the cash flow waterfall
   g. Adding scenario analysis

9. Case Study Presentation
   a. Review of model and addition of summary analysis
   b. Graphing of cash flow waterfall
   c. Presentation of key results from public perspective
   d. Adding alternative scenario analyses
These are my humble suggestions.

I will work on the data for the market and the Ports and railway for you to have them.