Case Study – The Price is Right

Question Appeared in: ModelOff 2015 Round 2

Time Allocated: 40 minutes

INTRODUCTION

You have been hired by a consortium to assist with their financial modelling for an upcoming tender. The tender is a government contract to operate and maintain for 15 years an existing asset, a major water treatment facility. If successful the consortium plans to set up a new company called "OpCo" (short for Operating Company) which will carry out the contract. As part of the tender submission the consortium is required to bid the amount of revenue it would like OpCo to receive in order to operate and maintain the asset.

Your task is to:

- Model the year 1 expenses in accordance with the data below.

- Model the growth profile of the expenses over the contract life.

- Model the additional Lifecycle Costs (non-recurring one-off expenditure relating to major maintenance work).

- Back solve the necessary bid values for the revenue stream, in order to meet the consortium's internal revenue sizing conditions.

You will probably need to build a simple Cash Flow statement of OpCo in order to complete this task.

Information is provided below regarding the assumed expenses of OpCo, the escalation assumptions for both revenues and expenses, as well as general model assumptions. Use your model to answer the case study questions.

ASSUMPTIONS

General Model Assumptions

- Your model should be a quarterly model spanning 15 calendar years, from 1 January 2016 to 31 December 2030.

- Unless otherwise specified, assume all book entries and cashflows occur on the final day of the quarter.

Revenues

- Revenues are based on two bid values called *Base Payment 1* ("**BP1**") and *Base Payment 2* ("**BP2**")

- BP1 and BP2 are *annual* amounts, expressed in real January 2016 dollars.

- Revenue payments are made every quarter. The amount paid each quarter end date is equal to

  Payment each quarter = (BP1 * 0.25 * IF1) + (BP2 * 0.25 * IF2)

- IF1 and IF2 refer to *Indexation Factor 1* and *Indexation Factor 2* (see below).

Expenses

- Expenses are categorised in four types:
    - Labour, which escalates at Indexation Factor 3 ("IF3")
    - Materials, which escalates at Indexation Factor 4 ("IF4")
    - Other Expenses, which escalates at Indexation Factor 5 ("IF5")
    - Profit Margin, which is sized as a set percentage of the total of the other three expense categories. This represents a regular and required payment to OpCo's parent companies.

- Labour Expenses per quarter are $2,500,000 * IF3

- Materials Expenses per quarter are $1,750,000 * IF4

- Other Expenses per quarter are $750,000 * IF5

- Profit Margin Expenses each quarter are 9.00% of the total of Labour, Materials and Other Expenses.

Lifecycle Costs

- On 31 December 2021, lifecycle costs of $10,000,000 are incurred (no further escalation needs to be applied to this amount).

- On 30 June 2028, lifecycle costs of $5,000,000 are incurred (no further escalation needs to be applied to this amount).

- Assume these amounts are fully expensed at the time they are incurred, and are not depreciated. No profit margin is earned on the Lifecycle Costs.

Escalation and Indexation

- IF1 is equal to 1.00 at 1 Jan 2016, and increases by 2.2% every subsequent 1 January.

- IF2 is equal to 1.00 at 1 Jan 2016, and increases by 4.0% every subsequent 1 January.

- IF3 is equal to 1.00 at 1 Jan 2016, and increases by 4.8% every 1 July

- IF4 is equal to 1.00 at 1 Jan 2016, and increases by 2.5% every subsequent 1 January

- IF5 is equal to 1.00 at 1 Jan 2016, and increases by 2.0% every 1 July

Debt

- All of OpCo's Expenses and Lifecycle Costs are paid for by cash at the end of each quarter, after receiving the Revenue Payments for that quarter.

- If required, OpCo has access to a short term revolving debt facility. Any cash shortfall after paying expenses and lifecycle costs is borrowed from the facility at the end of each quarter. Any excess cash remaining after paying expenses and lifecycle costs is applied towards any outstanding balance of the debt facility.

- When the facility is drawn, interest is charged each quarter at a rate of **3% per quarter** of the quarter's opening balance.

Cash Float

- At the beginning of the contract, OpCo starts with a cash balance of $5,000,000, provided by its parent companies as operating cash. At the end of the 15 year contract, OpCo is required to return $5,000,000 to its parent companies.

Other Considerations

- Assume that all taxes are zero.

- Assume that no interest is earned on OpCo's positive cash account balance.

Revenue Sizing Conditions

- Values for BP1 and BP2 should be set so that the forecast cash balance on 31 Dec 2030 is exactly zero after paying expenses, returning the cash float and paying any outstanding debt balance.

- Neither BP1 nor BP2 can be negative (one of them can, in theory, be zero though)

In addition to the two conditions above (which should be adhered to for all questions), the following additional Revenue Sizing conditions apply to specific questions as indicated:

- For Questions 27 to 29, Revenue sizing is not needed.

- For Questions 30 to 31, follow the requirements given in the question.

- For Questions 32 to 35, BP1 must be an integer multiple of $500,000.

- For Questions 32 to 37, BP1 and BP2 should be sized so that the term "**ADS**" is minimized.

    o "ADS" stands for Absolute Difference Sum and is equal to the sum over all quarters of D

    o D, for any given quarter, is equal to the **absolute value** of:

        ▪ Revenues – Expenses – Lifecycle Costs

There is no workbook provided for this section. You will need to create your own.

Questions

Question 1

What are the total Labour Expenses in calendar year 2019? [2 marks]

a. $11,786,466

b. $11,786,471

c. $11,786,476

d. $11,786,481

e. $11,786,486

f. $11,786,491

Question 2

What is the total Profit Margin Expense in the quarter ending 31 March 2025? [2 marks]

a. $620,463

b. $620,467

c. $620,471

d. $620,475

e. $620,479

f. $620,483

Question 3

What is the total of all Expenses and Lifecycle Costs over the contract term? [2 marks]

a. $446,192,956

b. $446,192,962

c. $446,192,968

d. $446,192,974

e. $446,192,980

f. $446,192,986

Question 4

Assume that BP1 is set to be $9,000,000, and BP2 is sized so that the final cash balance is zero. What are the last 5 digits (when rounded to the nearest whole dollar) of BP2? [3 marks]

a. 97,101

b. 97,201

c. 97,301

d. 97,401

e. 97,501

f. 97,601

Question 5

Assume that BP2 is set to be 250% of BP1, and that both values are sized so that the final cash balance is zero. What is the combined value of BP1 + BP2, rounded to the nearest $10,000? [4 marks]

a. $23,100,000

b. $23,110,000

c. $23,120,000

d. $23,130,000

e. $23,140,000

f. $23,150,000

Question 6

For Questions 6 to 11, revenue should be sized so as to minimize the value of ADS.

For Questions 6 to 9, BP1 must be an integer multiple of $500,000.

If BP1 is required to be an integer multiple of $500,000, and BP1 and BP2 set so that the closing cash balance must still be zero, what is the value of BP1 which minimizes ADS? [3 marks]

a. $1,500,000

b. $2,500,000

c. $3,500,000

d. $4,500,000

e. $5,500,000

f. $6,500,000

Question 7

Using the correct values for BP1 and BP2 solved for in Question 6, what is the solved minimum value of ADS? Round your answer to the nearest $1,000. [4 marks]

a. $28,867,000

b. $28,868,000

c. $28,869,000

d. $28,870,000

e. $28,871,000

f. $28,872,000

Question 8

Using the correct values for BP1 and BP2 solved for in Question 6, what is the total Interest paid on the debt facility over the contract term? [4 marks]

a. $17,610

b. $17,613

c. $17,616

d. $17,619

e. $17,622

f. $17,625

Question 9

Using the correct values for BP1 and BP2 solved for in Question 6, calculate the ratio of BP2 : BP1 and express it as a percentage to 2 decimal places. What are the 2 decimal places to the right of the decimal point? [4 marks]

a. 07

b. 12

c. 17

d. 22

e. 27

f. 32

Question 10

For Questions 10 and 11, assume that the interest rate on the debt facility is zero, and that BP1 and BP2 are now free to be any non-negative values, including ending in fractions of a cent.

Under these conditions, there is a unique pair of values for BP1 and BP2 that minimizes the value of ADS. You will need to find this unique pair of values (using whatever modelling approach you prefer) in order to answer the next two questions.

Change the interest rate of the debt facility to zero, and identify the pair of values for BP1 and BP2 that minimise ADS. Under this scenario, what are the last 3 digits (when rounded to the nearest whole dollar) of the value of ADS? [6 marks]

a. 239

b. 250

c. 261

d. 272

e. 283

f. 294

Question 11

This question uses the same assumptions and conditions as the previous question.

Round BP1 to the nearest whole dollar, and you will have a number that is either 6, 7 or 8 digits long. What is the sum of these digits? [6 marks]

a. 27

b. 30

c. 33

d. 36

e. 39

f. 42

Answers

1	B
2	D
3	E
4	B
5	A
6	C
7	B
8	D
9	A
10	F
11	A