**P3 Risk Assessment Exercise**

**Objectives of this exercise**

* Learn how to estimate, for use in VfM analysis, the cost impacts of base cost variability, pure risks, lifecycle performance risks, and revenue risk uncertainty adjustments; as well as the value of risks retained by the public agency and those transferred to the concessionaire under a P3.
* Learn how to estimate the value of risks for use in benefit-cost analysis.
* Be able to explain the role of financial conditions in developing a market-based estimate of the costs of lifecycle performance risks and revenue uncertainty.

**Project Background**

A study was done previously by a state DOT to estimate Value for Money and net social benefits of P3 delivery for a highway project. The various inputs required for the analysis are included in the P3-VALUE 2.0 spreadsheet model. The project information is as follows:

* 20 miles highway expansion
* Expansion from 3 lanes to 5 lanes in each direction:
  + 3 General Purpose Lanes (GPL)
  + 2 Managed Lanes (ML)
* Costs under PSC (excluding risks and financing):
  + Pre-construction & construction: $25M and $400M respectively
  + Routine O&M: $4M per year
  + Major maintenance: $10M (every 8 years)
* Preconstruction under PSC starts in 2015; 2 years duration
* Construction duration under PSC: 4 years, starting in 2017
* Operations period under PSC: 40 years, starting in 2021

**Analysis Steps**

* Part A: Risk Valuation for use in VfM Analysis: Review the DOT’s cost estimates, for VfM analysis, for the following:
  + Base cost variability, pure risk and lifecycle performance risk costs, and revenue risk uncertainty; and
  + The value of risks retained by the public agency and transferred to the concessionaire under a P3
* Part B: Risk Valuation for use in Benefit-Cost Analysis: Review the DOT’s cost estimates, for benefit-cost analysis, for the following:
  + Base variability, pure risk and lifecycle performance risk costs.
* Part C: Valuation of Lifecycle Performance Risks and Revenue Uncertainty: Test the impacts of financial conditions on market-based cost estimates of lifecycle performance risk and revenue uncertainty.

**Part A: Risk Analysis for VfM**

1. Open P3-VALUE 2.0 Excel file.
2. When opening the file, Excel may prompt you to approve the use of macros. To do so, click “Enable editing” and/or “Enable content” on the yellow bar across the top of the screen.
3. After the model opens, the following user form will appear.



1. Select the “Training Navigator” to access the training modules. The “Training Navigator” contains four training modules that provide limited access to only the most relevant inputs and outputs for a particular training session.
2. Select “Module 3: Risk Assessment” and proceed with the steps below (Note that the Training Navigator window may be closed and reopened at any point. Also, the tool has already been optimized and therefore optimizing the tool is not required unless specified).
3. Review the cost impacts of each of the following for the Conventional Delivery and P3 Options:
4. Base cost variability
5. Pure risks
6. Lifecycle performance risks
7. Revenue uncertainty (toll concessions only)

***Step 1: Conventional Delivery (PSC)***:

The PSC risks include (1) Base variability; (2) Pure risks; (3) Lifecycle performance risks; and (4) Revenue uncertainty.

Review the key PSC project information in the ***InpRisk***sheet of the model provided.

* **Pure risk** inputs: risk probabilities (row 10), most likely impact, impact distribution (uniform or triangular), minimum/maximum impact variation relative to most likely impact (rows 16-27 and rows 33-38)
* **Base variability** inputs: percentage of costs (rows 45-47)
* **Lifecycle performance risk** inputs: lifecycle performance risk cost estimate or P3 financing conditions (rows 52-53)
* **Revenue uncertainty adjustment** inputs: revenue uncertainty “haircut” or P3 financing conditions (rows 59-60)

Review the key PSC project information in the ***InpFin*** sheet of the model provided.

* **Lifecycle performance risk** inputs/financing conditions:
  + P3 cost of equity and gearing (rows 54-55)
  + P3 debt and equity bridge loan interest rates (rows 61-62)
  + P3 minimum debt service coverage ratio (DSCR, row 64)
* **Revenue uncertainty adjustment** inputs:
  + P3 - Difference between Availability Payment WACC and Toll Concession WACC (row 71)

Review and record below the Conventional Delivery risk values for VfM (see ***Risk Output for VfM*** sheet)

|  |  |  |
| --- | --- | --- |
| **Item** | **Risks under Conventional Delivery** | |
| **NPV risk values ($M, Column G)** | **Nominal risk values ($M, Column H)** |
| Total Pure risks (row 28) |  |  |
| Total Base variability (row 34) |  |  |
| Lifecycle performance risk premium (row 36) |  |  |
| Revenue uncertainty adjustment (row 38) |  |  |
| **Total risks under Conventional Delivery (row 45)** |  |  |

***Step 2: P3 Option***:

Differences between P3 and Conventional Delivery that could affect P3 risk values may include:

* P3 differences with regard to lifecycle costs and risk management, potentially leading to a reduction in costs and risk valuation
* Share of pure risks transferred to the concessionaire

Review the P3 differences assumed for pure risks and base variability in the ***InpRisk*** sheet.

Review and record below the retained P3 risk values for VfM (see ***Risk Output for VfM*** sheet).

|  |  |  |
| --- | --- | --- |
| **Item** | **Risk Retained by Agency under P3** | |
| **NPV risk values ($M, Column J)** | **Nominal risk values ($M, Column K)** |
| Pure risks (row 28) |  |  |
| Base variability (row 34) |  |  |
| Lifecycle performance risk premium (row 36) |  |  |
| Revenue uncertainty adjustment (row 38) |  |  |
| **Total risks retained under P3 (row 45)** |  |  |

Review and record below the transferred P3 risk values for VfM (see ***Risk Output for VfM*** sheet).

|  |  |  |
| --- | --- | --- |
| **Item** | **Risk Transferred to P3 Developer** | |
| **NPV risk values ($M, Column M)** | **Nominal risk values ($M, Column N)** |
| Pure risks (row 28) |  |  |
| Base variability (row 34) |  |  |
| Lifecycle performance risk premium (row 36) |  |  |
| Revenue uncertainty adjustment (row 38) |  |  |
| **Total risks transferred under P3 (row 45)** |  |  |

Below, please respond to the following questions; we will also discuss them at the webinar:

1. What is the discount rate used to calculate NPV of the P3 risks *(see top of column M)?* Why is it different from what is used for calculating NPV of risks under conventional delivery?

Please fill in the blanks below (see ***Risk Output for VfM*** sheet):

* Nominal value of all risks retained by Agency under PSC $\_\_\_\_\_\_M
* Nominal value of all retained + transferred risks under P3 $\_\_\_\_\_\_M
* Nominal value of difference $\_\_\_\_\_\_M

1. Does the difference indicate that the overall risk transfer was beneficial to the Agency?
2. Compare the P3 and PSC total ***nominal values*** of risks. Then compare the total ***net present values*** for P3 and PSC. Can you explain the larger differences?
3. Compare the ***nominal values*** of the revenue risk uncertainty adjustment for P3 and PSC. Can you explain why they differ?

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**Part B: Risk Valuation for Benefit-Cost Analysis**

Review Project Delivery BCA (PDBCA) ***present values*** of the following risks for the Conventional Delivery and P3 Options: (1) Base cost variability; (2) Pure risks; (3) Lifecycle performance risks

Review and record below the ***present values*** of risks for Delayed Conventional Delivery and Conventional Delivery for PDBCA (see ***Risk Output for PDBCA*** sheet)

|  |  |  |
| --- | --- | --- |
| **Item** | **Delayed Conventional Delivery Risk values NPV @ 3.00% ($M) for PDBCA**  **(Column G)** | **Conventional Delivery Risk values NPV @ 3.00% ($M) for PDBCA**  **(Column J)** |
| Pure risks (row 28) |  |  |
| Base variability (row 34) |  |  |
| Lifecycle performance risk premium (row 36) |  |  |
| **Total risks (row 38)** |  |  |

Below, please respond to the following questions (we will also discuss them at the webinar):

1. Why are revenue risks not included in the table?
2. Why are the values higher under Conventional Delivery than under Delayed Conventional Delivery?

Review and record below the present values of risks under Conventional Delivery and P3 for PDBCA (see ***Risk Output for PDBCA*** sheet)

|  |  |  |
| --- | --- | --- |
| **Item** | **Conventional Delivery Risk values NPV @ 3.00% ($M) for PDBCA**  **(Column J)** | **P3 Risk values NPV @ 3.00% ($M) for PDBCA**  **(Column M)** |
| Pure risks (row 28) |  |  |
| Base variability (row 34) |  |  |
| Lifecycle performance risk premium (row 36) |  |  |
| **Total risks (row 38)** |  |  |

Below, please respond to the following questions; we will also discuss them at the webinar:

1. Why are risks transferred to the P3 not shown separately, as on the ***Risk Output for VfM*** sheet?
2. Compare the lifecycle performance risk values. Why are they different, given that the market-based WACC was used to estimate both values?
3. Were overall risk costs reduced with the P3 option? Why do you think so?

**Part C: Part C: Use of WACC to Value Risk**

Assume that, due to new information on revenue uncertainty, project financiers perceive much higher revenue risk and financing conditions will change. In ***InpFin***, increase the cost of equity (I54) and interest rates (I61 & I62) by 2% each. Optimize the model and record the revised WACC below (WACC values are listed in a pop up window after the model is optimized. The value will also be equal to the discount rate applied to the P3 Developer seen in the ***Risk Output for VfM*** tab) :

* Prior WACC (row 3, column M) = \_\_\_\_\_\_\_\_\_%
* Revised WACC = \_\_\_\_\_\_\_\_%
* Increase in WACC = \_\_\_\_\_\_\_\_%

Use the model to calculate the new value of revenue uncertainty by adding the increase in WACC to the existing revenue uncertainty adjustment input in ***InpFin***:

* Difference between Availability Payment WACC and Toll Concession WACC (row 71) = 1.6% + Increase in WACC = %

Optimize the model again

Review and record below the nominal risk values for VfM (see ***Risk Output for VfM*** sheet).

|  |  |  |  |
| --- | --- | --- | --- |
| **Item** | **Nominal risk values ($M)** | | |
| **Conventional Delivery  (Column H)** | **Retained risks P3 (Column H)** | **Transferred risks P3  (Column N)** |
| Pure risks (row 28) |  |  |  |
| Base variability (row 34) |  |  |  |
| Lifecycle performance risk premium (row 36) |  |  |  |
| Revenue uncertainty adjustment (row 38) |  |  |  |
| **Total risks (row 45)** |  |  |  |

Please fill in the blanks below (see ***Risk Output for VfM*** sheet):

* Nominal value of risks (all retained by Agency) under PSC $\_\_\_\_\_\_M
* Nominal value of total (retained + transferred) risks under P3 $\_\_\_**\_\_\_**M
* Nominal value of difference $\_\_\_\_\_\_M

Below, please respond to the following questions; we will also discuss them at the webinar:

1. Did the nominal values of the PSC and P3 increase or decrease relative to the base values you calculated in Step 2 of Part A? Can you explain why?
2. We only changed financial input values for the P3. Yet the values of risks under Conventional Delivery also changed. Can you explain why?
3. Does the difference still indicate that the overall risk transfer would be beneficial to the Agency?

1. How do you think subsidized debt (such as TIFIA) will impact the estimated value of the lifecycle performance risk? For a fair comparison between Conventional Delivery and P3, would you need to adjust for this, assuming that the WACC is used to estimate the revenue uncertainty and lifecycle performance risks for both Conventional and P3 delivery?

**Thank you for your efforts! To receive a certificate from FHWA’s Office of Innovative Program Delivery acknowledging your participation in the Webinar and completion of the exercise, please email your completed answers by Monday, March 14 at 10:00am Eastern to Patrick DeCorla-Souza at:** [**patrick.decorla-souza@dot.gov**](mailto:patrick.decorla-souza@dot.gov)