



Value for Money Analysis: *Homework Assignment Review*

P3-VALUE Webinar – February 21, 2014

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Background

- This webinar is a follow-up webinar to review the homework assigned at the Value for Money Analysis webinar presented on January 23, 2014
- Run a Value for Money analysis using the P3-VALUE tools with the hypothetical project data presented on January 23, 2014 webinar:
 - Availability payment concession
 - Toll concession
- Value for Money Analysis webinar recording and materials are available at:
http://www.fhwa.dot.gov/ipd/p3/toolkit/p3_value_webinars/index.htm



Webinar Outline

Part 1

Value for Money Analysis for an Availability Payment P3 Project

Part 2

Value for Money Analysis for a Toll Concession P3 Project



Webinar Objectives

After participating in this “office hours” webinar you should be able to:

- Explain the Value for Money analysis results from runs of the P3-VALUE Public Sector Comparator (PSC) Tool and Shadow Bid Tool
- Undertake sensitivity tests of various assumptions made in conducting a Value for Money analysis
- Undertake a Value for Money analysis for an Availability Payment P3 Concession project and explain its results
- Undertake a Value for Money analysis for a Toll Concession P3 project and explain its results



Part 1

Value for Money Analysis for an Availability Payment P3 Project



Hypothetical PSC Cost Data

- Design-Bid-Build (or Design-Build)
- Base design/construction costs of \$30M in Year 1 and \$70M in year 2 – in nominal dollars (to match inflation assumption of 0% for construction phase)
- \$10 million (real dollars) annual O&M costs over 28 years
- Risk cost estimates for design-build phase:
 - 10% probability (P10) that they will be at or below \$10 M
 - 70% probability (P70) that they will be at or below \$20 M
 - 90% probability (P90) that they will be at or below \$30 M
- Risk cost estimates for operations phase:
 - 10% probability (P10) that they will be at or below \$1 M
 - 70% probability (P70) that they will be at or below \$2 M
 - 90% probability (P90) that they will be at or below \$3 M



Hypothetical PSC Assumptions

- Financing:
 - “Bond” or “draw” financing for 100% of construction costs, at 5% interest and 30-year maturity
 - Bond issuance costs of 2% of borrowed amount are financed as part of the debt
 - Reserves (for debt service and O&M) are required to be financed
- Inflation = 3% annually
- Discount rate = 5%
 - This rate is the same as the public sector borrowing rate
 - It assumes that all project risks are accounted for in the cash flows’ including:
 - Risks that would be transferred to contractors
 - Risks that would be retained by the public agency for each phase, as well as “systematic” risks, project coordination risks, and long-term performance risks



Illustrative Project Revenues

- Base revenue estimate:
 - Average Annual Daily Traffic (AADT) in Year 3 = 21,600 vehicles, no growth over project life (for simplicity)
 - Average toll rate = \$2.00 in Year 0 dollars (increases with inflation)
 - Year 3 Revenue = $21,600 \times 365 \text{ days} \times \$2.19 = \$17.2 \text{ M}$
- Adjustment for “revenue leakage,” i.e., uncollected tolls (5% reduction):
 - Year 3 = $\$17.2 \text{ M} - \$0.8 \text{ M} = \$16.4 \text{ M}$
- Ramp-up period (Year 3 and Year 4):
 - Year 3 = 67% reduction = $\$16.4 \text{ M} - \$11.0 \text{ M} = \$5.4 \text{ M}$



Hypothetical Shadow Bid Costs

- DBFOM with “availability payments” made by public agency over a 30-year concession term, contingent on meeting performance standards; toll revenue is allocated to the public agency
- 10% DB cost reduction relative to PSC
- 5% O&M cost reduction relative to PSC
- Risk management efficiency
 - 50% of design-build phase risk costs are transferred
 - 100% of operations phase risk costs are transferred
 - 25% lower risk costs for all transferred risks



Hypothetical Shadow Bid Assumptions

- Financing costs
 - Project funded 80% by bank debt and 20% by equity
 - Average debt interest rate is 6% (vs. 5% for PSC)
 - Required after-tax return on equity is 12% (“hurdle” rate)
 - Reserves (for debt service and O&M) are required to be financed
 - For simplicity, there is no consideration of taxes paid by concessionaire, since after-tax equity return is used
- Inflation = 3% annually
- Discount rate = 5%
 - This rate is the same as the public sector borrowing rate
 - It assumes that all project risks are accounted for in the operational cash flows through contingencies, and through risk premiums in financing costs



P3-VALUE Demonstration

- We will now transition to the P3-VALUE tools and review the inputs and outputs of:
 - PSC Tool
 - Shadow Bid Tool



PSC Results with “Draw” Option

- Results for P70 scenario are shown in the middle column

Nominal Discount Rate	Results - Risk Adjusted Payments (\$)		
	PV of Payments with P10 Risk Adjustment	PV of Payments with P70 Risk Adjustment	PV of Payments with P90 Risk Adjustment
5.00%			
Payment Item			
Design and Construction After Subsidy #	-	-	-
Construction Phase Transferrable Risks #	-	-	-
Construction Phase Retained Risks #	-	-	-
Operations	101,692,152	101,692,152	101,692,152
Routine Maintenance	101,692,152	101,692,152	101,692,152
Periodic Maintenance	-	-	-
Operations Phase Transferrable Risks	20,338,430	40,676,861	61,015,291
Operations Phase Retained Risks	-	-	-
Other Project Costs (ROW etc)	-	-	-
PSC Adjustments	-	-	-
Principal Debt Payments	41,890,908	45,768,288	49,645,668
Interest & Fee Payments	61,154,273	67,250,245	73,346,216
Total Payments	\$ 326,767,915	\$ 357,079,697	\$ 387,391,479
Toll and Other Revenue	(290,082,714)	(290,082,714)	(290,082,714)
Total Payments After Toll and Other Revenue	\$ 36,685,201	\$ 66,996,983	\$ 97,308,765



PSC Results with “Bond” Option

- Bond option results in higher NPC due to:
 - Additional up-front borrowing to pay bond interest during construction period when there is no toll revenue
 - Additional up-front borrowing of reserves required by lenders



Shadow Bid Costs (from P3-VALUE)

- **Note:** P70 estimates are in the middle column

Value for Money Analysis Results			
Manual Input	Risk Adjusted Payments (\$)		
5.00%	PV of Payments with P10 Risk Adjustment	PV of Payments with P70 Risk Adjustment	PV of Payments with P90 Risk Adjustment
Payment Item			
Availability Payments	\$ 329,228,341	\$ 351,564,296	374,172,641
Construction Phase Retained Risks	\$ 4,434,779	\$ 8,869,557	13,304,336
Operations Phase Retained Risks	\$ -	\$ -	-
Other Project Costs (For Agency)	\$ -	\$ -	-
Total Payments Before Toll Revenue	\$ 333,663,120	\$ 360,433,853	387,476,976
Toll and Other Revenue	\$ (290,082,714)	\$ (290,082,714)	(290,082,714)
Total Payments After Toll Revenue	\$ 43,580,406	\$ 70,351,139	97,394,262



P3-VALUE Availability Payment Results

- With P3-VALUE, the availability payment is inflated over the term of the concession, rather than being uniform throughout – that is why the first year availability payment is lower than we calculated with our simple model

Availability Payment			
Payment Calculation			
Annual Nominal Payment Amount:	P10	P70	P90
	16,187,500	17,285,714	18,397,321



Calculating the Virtual Risk Premium

- Change the discount rate to equal the WACC, calculated as a simple average cost of capital as follows:
 - $(80\% \times 6\%) + (20\% \times 12\%) = 7.2\%$
 - **Note:** Financial experts make a somewhat more sophisticated calculation in a simple financial model, reflecting:
 - Changing gearing (percentage equity / debt) over time
 - A sculpted repayment structure (following operational cash flows)
 - Other financing conditions (PLCR, DSCR, debt tail, reserve accounts)
 - Tax considerations
- The results page will present the PV of public payments in the Availability Payments line, which will be lower due to the higher discount rate
- To get the PV of the virtual risk premium, subtract the PV of the availability payments at the WACC rate from the PV of the availability payments at the risk-free rate



Calculating the Virtual Insurance Premium

	Availability Payment Concession (at P70)
PV of payments to Concessionaire using a risk-free discount rate	\$351.6M
PV of payments to Concessionaire using WACC for an availability payment P3 as discount rate	\$255.8M
<i>PV of risk premium based on difference</i>	\$95.8M



Revised Comparison with Full Accounting of Risks in PSC

Public Costs (\$M) for P70 Scenario

		<u>P70 Risk-Adjusted NPC</u>	<u>Additional P70 Concessionaire Risk</u>	<u>P70 NPC Adjusted for Concessionaire Risks</u>
a	PSC (with “draw” option)	\$357.1M	\$95.8M	\$452.9M
b	P3 Availability Payment concession	\$351.6M	N.A.	\$351.6M
	<i>VfM (a – b)</i>			\$101.3M

- **Note:** Public costs are before consideration of toll revenues, which accrue to the public agency under both options

Questions?

Submit a question using the chat box



Or



Dial *1 to call in your question by phone



Part 2

Value for Money Analysis of a Toll Concession P3 Project



Homework Assignment

- Run a Value for Money analysis using the P3-VALUE tools with the hypothetical project data for a toll concession option using the same data as for the availability payment project, with the exception of Financing Assumptions

Financing Assumptions

- Project funded 70% by bank debt and 30% by equity
- Average debt interest rate is 7.0% (vs. 5% for PSC)
- Required after-tax return on equity is 14% (“hurdle” rate)
- No consideration of taxes paid by concessionaire, since after-tax equity return is used



P3-VALUE Demonstration

- We will now transition to the P3-VALUE tools and review the inputs and outputs of:
 - PSC Tool
 - Shadow Bid Tool

Toll Concession Results

- **Note:** Revenues are not shown because the table only includes public agency costs

Value for Money Analysis Results			
Manual Input	Risk Adjusted Payments (\$)		
5.00%	PV of Payments with P10 Risk Adjustment	PV of Payments with P70 Risk Adjustment	PV of Payments with P90 Risk Adjustment
Payment Item			
Availability Payments	\$ 42,426,453	\$ 54,842,409	75,159,174
Construction Phase Retained Risks	\$ 4,434,779	\$ 8,869,557	13,304,336
Operations Phase Retained Risks	\$ -	\$ -	-
Other Project Costs (For Agency)	\$ -	\$ -	-
Total Payments Before Toll Revenue	\$ 46,861,231	\$ 63,711,966	88,463,510
Toll and Other Revenue	\$ -	\$ -	-
Total Payments After Toll Revenue	\$ 46,861,231	\$ 63,711,966	88,463,510

Calculating the WACC

- The WACC, calculated as a simple average cost of capital as follows:
 - $(70\% \times 7\%) + (30\% \times 14\%) = 9.1\%$
 - **Note:** Financial experts make a somewhat more sophisticated calculation in a simple financial model, reflecting:
 - Changing gearing (percentage equity / debt) over time
 - A sculpted repayment structure (following operational cash flows)
 - Other financing conditions (PLCR, DSCR, debt tail, reserve accounts)
 - Tax considerations



Calculating the Virtual Risk Premium

- Change the discount rate in the Assumptions sheet to the WACC
- The results sheet only presents the PV of public costs, so only the PV of public subsidy is shown (in the Availability Payments line)
- To get the PV of toll revenue, you will need to run the Availability Payment option with the Toll Concession assumptions
- To calculate the virtual risk premium, click the “Availability Payment” option and note the Toll Revenues:
 - With the WACC as the discount rate
 - With the risk-free discount rate (to be changed in the assumptions sheet)



Calculating the Virtual Insurance Premium

	Toll Concession (at P70)
PV of payments to Concessionaire using a risk-free discount rate	\$54.8M
PV of payments to Concessionaire using WACC for a toll concession P3 as discount rate	\$48.9M
<i>(a) PV of risk premium based on difference</i>	\$5.9M
PV of toll revenues using a risk-free discount rate	\$290.1M
PV of toll revenues using WACC of a toll concession P3 as discount rate	\$160.3M
<i>(b) PV of risk premium based on difference</i>	\$129.8M
Total virtual insurance premium (a + b)	\$135.7M



Revised Comparison with Full Accounting of Risks in PSC

Public Costs (\$M) at P70

		<u>P70 Risk-Adjusted NPC</u>	<u>Additional P70 Concessionaire Risk</u>	<u>P70 NPC Adjusted for Concessionaire Risks</u>
a	PSC (with “draw” option)	\$357.1M	\$135.7M	\$492.8M
b	Toll concession (agency cost + tolls)	\$54.8M +\$290.1M	N.A.	\$344.9M
c	<i>VfM for toll concession</i>			\$147.9M

- **Note:** Public costs are before consideration of toll revenues, which accrue to the public agency under the PSC option



Summary of Comparisons of PSC and P3 Options

Public Costs (\$M) at P70

	<u>Excluding Toll Revenue Risk (PSC vs. Availability Payment)</u>	<u>With Toll Revenue Risk (PSC vs. Toll Concession)</u>
a PSC (with “draw” option)	\$452.9M	\$492.8M
b P3 Option	\$351.6M	\$344.9M
c VfM	\$101.3M	\$147.9M

- **Note:** Public costs change under the PSC option because the first option does not account for toll revenue risk
- P3 costs are lower under the toll concession primarily because of the early public “completion” payment of about \$50M which reduces financing costs



Upcoming P3-VALUE Training

- **Mar. 13:** P3 Financial Assessment 201
- **Apr. 18:** Office Hours: Financial Assessment Homework Assignment Review

To register for the March 13 webinar, please visit <http://www.nhi.fhwa.dot.gov/resources/webconference/eventcalendar.aspx>



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Questions?

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Or



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