

Net Present Value of Bonding Scenarios

EXECUTIVE APPROPRIATIONS COMMITTEE



Thomas Young & Angela Oh

July 2016

Why are we doing this study?

During the 2016 General Session, the Legislature passed the following intent language (H.B. 3, Item 63):

The Legislature intends that the Utah Department of Transportation prepare an analysis and financial report on the possibility of advancing construction of road projects currently programmed in the Transportation Investment Fund. The analysis should include consideration of the savings or additional costs associated with advancing the projects through the use of either short term debt or long term financing. The report should be reported to the Executive Appropriations Committee on or before the July 2016 legislative interim committee meetings.

So... What is Net Present Value?

Net Present Value (NPV) evaluates the cost of a project and its associated benefits across time. A positive NPV means that the benefits of a project outweigh the costs of a project over the specified time period. In our current study, the costs of bonding are weighted against the benefits of increased income and employment in the construction sector, time-savings from reducing congestion, and potential economic development effects.

$$\begin{aligned}
 NPV &= -C_0 + \frac{C_1}{(1+r_1)} + \frac{C_2}{(1+r_2)^2} + \frac{C_3}{(1+r_3)^3} + \dots + \frac{C_T}{(1+r_T)^T} \\
 &= -C_0 + \sum_{t=1}^T \frac{C_t}{(1+r_t)^t}
 \end{aligned}$$

3

Example of NPV

$$\begin{aligned}
 NPV &= -\$500 + \frac{\$25}{(1+.03)} + \frac{\$25}{(1+.03)^2} + \dots \\
 &\quad + \frac{\$25}{(1+.03)^{20}} = -\$138
 \end{aligned}$$

4

To the Current Study: Scenario 1 Example



5

The Assumptions on How We Got There

- Discount Rate at the True Cost of Interest (1.527% for the 10-year scenarios and 1.913% for the 15-year scenarios)
- Cash flow patterns as provided by Zions Bank and UDOT
- Increased economic activity multipliers as estimated by Regional Economic Models, Inc.
- Time savings as provided by UDOT and the Wasatch Front Regional Council
- Induced economic growth by using regression model across states

6

The Results

Results Matrix, 10-Year Bonding Scenarios					Results Matrix, 15-Year Bonding Scenarios				
Current Conditions					Current Conditions				
	Nominal Interest and Cost of Issuance	PV Cost	PV Benefits	Net		Nominal Interest and Cost of Issuance	PV Cost	PV Benefits	Net
Scenario 1	(\$115,510,500)	(\$97,996,636)	\$30,522,324	(\$67,474,312)	Scenario 1	(\$140,695,600)	(\$120,908,372)	\$30,638,703	(\$90,269,669)
Scenario 2	(\$124,719,250)	(\$106,064,915)	\$51,580,344	(\$54,484,572)	Scenario 2	(\$151,807,700)	(\$130,635,767)	\$51,390,613	(\$79,245,154)
Scenario 3	(\$164,414,000)	(\$139,304,112)	\$65,680,867	(\$73,623,245)	Scenario 3	(\$200,361,250)	(\$172,070,349)	\$65,452,816	(\$106,617,533)
Scenario 4	(\$263,652,250)	(\$215,243,625)	\$102,822,063	(\$112,421,563)	Scenario 4	(\$315,818,250)	(\$266,637,241)	\$102,420,878	(\$164,216,363)
Accelerated Growth					Accelerated Growth				
	Nominal Interest and Cost of Issuance	PV Cost	PV Benefits	Net		Nominal Interest and Cost of Issuance	PV Cost	PV Benefits	Net
Scenario 1	(\$132,837,075)	(\$112,696,131)	\$29,259,836	(\$83,436,296)	Scenario 1	(\$161,799,940)	(\$139,044,628)	\$29,365,922	(\$109,678,706)
Scenario 2	(\$143,427,138)	(\$121,974,653)	\$50,217,456	(\$71,757,197)	Scenario 2	(\$174,578,855)	(\$150,231,132)	\$50,016,573	(\$100,214,559)
Scenario 3	(\$189,076,100)	(\$160,199,728)	\$63,886,365	(\$96,313,364)	Scenario 3	(\$230,415,438)	(\$197,880,901)	\$63,644,437	(\$134,236,464)
Scenario 4	(\$303,200,088)	(\$247,530,169)	\$99,962,099	(\$147,568,071)	Scenario 4	(\$363,190,988)	(\$306,632,827)	\$99,542,259	(\$207,090,568)
Recessionary Decline					Recessionary Decline				
	Nominal Interest and Cost of Issuance	PV Cost	PV Benefits	Net		Nominal Interest and Cost of Issuance	PV Cost	PV Benefits	Net
Scenario 1	(\$109,734,975)	(\$93,096,804)	\$31,784,813	(\$61,311,991)	Scenario 1	(\$133,660,820)	(\$114,862,954)	\$31,911,485	(\$82,951,469)
Scenario 2	(\$118,483,288)	(\$100,761,670)	\$52,943,231	(\$47,818,438)	Scenario 2	(\$144,217,315)	(\$124,103,979)	\$52,764,654	(\$71,339,325)
Scenario 3	(\$156,193,300)	(\$132,338,906)	\$67,475,369	(\$64,863,537)	Scenario 3	(\$190,343,188)	(\$163,466,831)	\$67,261,195	(\$96,205,637)
Scenario 4	(\$250,469,638)	(\$204,481,444)	\$105,682,027	(\$98,799,417)	Scenario 4	(\$300,027,338)	(\$253,305,379)	\$105,299,496	(\$148,005,883)