URBP 250 Urban Planning Public Finance
URBP 175 Urban Studies Topics
Prof. Shishir Mathur

Exercise: Cost/ Benefit Analysis

Exercise Introduced: March 17, 2014
Exercise Due: April 14, 2014

Read the community profile below and respond to the questions
City of Sunnyville is faced with a problem of increased congestion on the south-bound section of its major arterial road, Aurora Avenue. This section is 15-mile long and takes on an average 30 minutes to cover by car. The city's public works department is proposing road widening from the present 2 lanes to either: option a) 3 lanes, or option b) 4 lanes, but has to undertake cost benefit analysis to determine which of the two options is better.

The department conducted several transportation studies on this road section, and along with the information from other studies found that:

- Adding one more lane reduces the average driving time on this section from 30 minutes to 24 minutes, i.e. a 6-minute saving; while adding 2 more lanes results in saving of 10 minutes (from 30 minutes to 20 minutes).
- On an average 3,300 vehicles pass through this road section per day (including the weekends).
- People put a monetary value to saving of time as being equal to one-third of their hourly wage. In this town, the average hourly wage of the daily user of this road section is $30/hr.
- The construction cost per lane-mile of the road is $0.53 million.
- The department has usually used a discount rate equal to a 10-yr note, which at present is 6%.
- The average vehicle occupancy is 1 person/vehicle.
- It can be safely assumed that the benefits will be realized for 10 years and will be constant throughout this period.
- It is assumed that cost of construction is incurred in the beginning of year 1 and the benefits are realized at the end of each year, from year 1 to 10.

Question 1: What major benefits, other than time saving, can be realized by road widening?

Question 2: Under what circumstances would you use a discount rate different than the rate for 10-year note (6%, in this scenario)?

Question 3: Conduct a cost/ benefit analysis to show which of the two options is better.
Option A: Add one more lane
Option B: Add 2 more lanes

Procedure:
For each option follow the procedure outlined below:

a. Calculate the cost, which here is the cost of construction (assume it to be accrued at the beginning of year 1)
b. Calculate the benefit, which here is the monetary value of time saving. Calculate the annual dollar amount for this benefit. Remember that this amount will be realized for each of the 10 years and has to be discounted at 6%. (Use the NPV Table on the course webpage.)
c. Divide total benefits by total costs to find out the benefit to cost ratio.
d. Repeat steps ‘a’ to ‘c’ for both the options.
e. The option which results in higher benefit to cost ratio is the desired one.