**Review**
Evaluating CEE Projects

Sample Problems

Benefits of investment

Figure 1 shows supply and demand curves for housing in 2002 in a city where the housing supply is rather limited. The city is considering a major program to encourage new housing construction by offering tax breaks to developers, making land available at very low cost, and constructing housing for the elderly. A study by real estate consultants estimates that this program will shift the supply curve to S1, which is also shown in the figure.

a. Estimate the total annual benefits to residents from lower housing costs if the program is implemented.

   b.   What other benefits might be achieved by this program?

Supply & Demand for Apartments
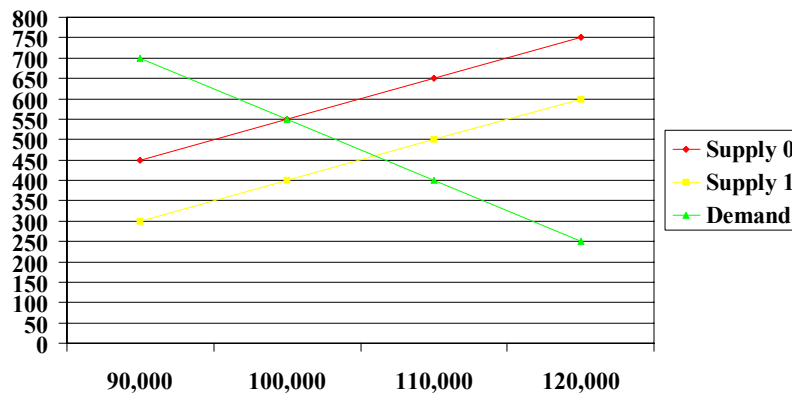
Sensitivity Analysis

A city wants to build a new bridge to relieve congestion. The mayor wants a private company to build and operate the facility, which is expected to cost $100 million to construct and $1 million per year to operate. If demand projections are correct, there will be 20,000 cars/day (total of inbound plus outbound) using the bridge and the average savings will be about 10 minutes each way for these commuters, whose value of time in commuting was estimated to be on the order of $10/hour.

a. You are considering bidding on the project. To bid, you need to state what toll you will charge and agree to pay all investment and operating costs. What toll will you need to charge just to cover your investment costs plus your operating costs, assuming that your cost of capital is 10%? What toll would you have to charge to achieve a pre-tax ROI of 15% for this $100 million project?

b. Identify four risks associated with this project.

c. Public support could help reduce some of these risks.   Would you rather have the mayor urge the city council to agree to a) cover 5-10% of the construction costs, b) pay 25-50% of the annual operating costs, or c) simply guarantee the loans so that you could lower your cost of capital by 1% or more?

d. The mayor is also willing to allow you to charge whatever toll you like instead of providing any of the concessions discussed in part c. Explain why this is or is not a good option.

Cost Estimation

a. The cost of a 10,000 square-foot apartment building was $400,000 in 1990, when a cost index for apartment buildings was at 180. The cost-capacity factor for this type of building is estimated to be 0.8. Estimate the current cost for a 15,000 square-foot apartment building assuming that the cost index now stands at 240.

b. You estimate that your construction requires 100 hours to do a certain task for the first time. Based upon a 95% learning curve, how much time will be required to do this task for the fifth time?

c. What is the average time to do this task for the first 5 times?

d. You are bidding for a 1,000 square meter warehouse construction job. You estimate that a crew of 8 people will require thirty 10-hour working days to complete the job. Labor costs are $10/hour, material costs are $50/square meter, finishing costs are $40,000 and overhead costs are $60,000. What should be your bid/square meter assuming that you want 15% profit?

Discussion of Problems

Benefits of investment

a. The public benefits can be taken to be the increase in consumer surplus that is gained by adding more supply. Existing renters enjoy lower rents (100,000 renters * $150/month), while an additional 10,000 units are rented to new tenants (10,000 renters * $150/month/2). In this case the demand curves is a straight lines, so the benefits to the new tenants are precisely as shown. The "Rule of ½" can be used if the demand curve is a curve (not straight): benefits to new users will average "one half the reduction in price".

b. Additional benefits might include the multiplier effect of investment on the local economy, increased land values in locations where the construction improves the neighborhood (but lower rents may tend to depress land prices), better (or worse) aesthetics for the neightborhood.

Sensitivity Analysis

c. 10% of construction cost has NPV of $10 million or AW of $1 million at your cost of capital - sounds good as a start.

d. 50% of annual operating costs are $0.5 million per year - not much!

e. A 1% reduction in my cost of capital will save 1% of $100 million per year, i.e. $1 million or more. There is no direct cost to the city, assuming I don't default (and with their support there is less chance that I will default)

f. Raising the tolls will cause political problems and reduce demand; depending upon the demand curve, higher tolls may not even reduce total revenue.

Since capital costs are my biggest problem, I'd go for the loan guarantee and try to get my cost of capital down to 7 or 8%.

Cost Estimation

Answering this question requires understanding of several methods commonly used in cost estimation:

Price and cost indices
Learning curves
Cost functions