

OPTIMUM INCREMENT FOR CAPACITY EXPANSION -- NON LINEAR DEMAND GROWTH

Prepared by: Ioanna Boulouta under the supervision of Professor Richard de Neufville

GOAL:

Improve your understanding of capacity expansion problem and its possible optimal solution under a different demand growth scenario.

GENERAL PROBLEM OUTLINE:

In this exercise you consider the same capacity expansion problem as in the base case exercise but this time with a different demand growth pattern. Use the same base case model ([click here to access the model](#)) and assume an exponential demand growth pattern instead of a linear pattern. You will find out what the optimal policy for capacity addition in this case is.

ACTIONS:

1. In the inputs worksheet change the capacity increment from 5 units/year to a percentage increment, for example 0.05 for 5% annual capacity increment and repeat steps 3 to 4 of base case exercise to find optimal cycle time under this scenario.
2. Find out what the optimal cycle time is under a faster growth pattern by changing demand increments from 5% to 20% to 40%.
3. Repeat step 5 of the base case exercise with demand increments of 2% and 8% and compare the average NPV with the NPV found with 5% demand growth pattern.

DISCUSSION QUESTIONS:

1. What is the optimal cycle time predicted by the model with an exponential demand growth pattern of 5%? How does this result compare with the base case?
2. How does the optimal cycle time change with faster demand growth patterns?
3. Compare the average NPV of 2% and 8% demand growth with the NPV found with average demand growth pattern of 5%. Are these values equal? Why?

TAKE AWAY:

1. The optimal cycle time gets smaller when demand grows exponentially. The faster the growth rate the smallest the optimal cycle time.
2. Under exponential demand growth the "flaw of averages" still holds.