4311 Finance Lab

Project 6

Capital Budgeting Monte Carlo Simulation

**Comment:** Project overviews are meant to layout the minimum requirements for a given project and to explain the motivation for a given project. Meeting the minimum requirements does not guarantee an A or even a passing grade. These projects are very rich, with many possible extensions to the analysis, various interpretations and recommendations from the results, and alternative methods of analysis that can be applied or discussed relative to the primary method introduced in the project. The finance faculty wishes to give students a chance to differentiate themselves to potential employers in the interview process and have left “meet on the bone” for the students to explore.

In industry, project overviews are rarely, if ever, created. Your boss will simply say “do this” and expect you to formulate the required aspects of the project. In addition, detailed written reports, as are required for this class, are also rarely done in industry. However, employers want to know that potential employees are not only technically capable, but also can communicate their findings effectively in written form. Proof read your papers. DO NOT write sentences that you do not understand but think that the professor will. Use proper grammar, spelling, and effective organization of the material presented. Do not think “what does the professor want”; rather think “what would impress my boss” or “what would get the customer to choose my company”. Bosses and customers are busy. They hate too much information more than to little information. Be clear and to the point. Look for ways to table or plot critical information so that readers can understand the results at a glance. Good Luck.

**Motivation:** A capital budget represents the intersection of multiple predictions of the future. We predict sales, prices, demand, discount rates, and many other variables into the future in order to estimate the NPV of a project. All predictions of the future come with uncertainty or risk. The previous capital budgeting project assumed that the mean values of the predictions were in fact the realized values. For example, the growth of sales in the 10th year was assumed to be exactly, for example, 2.41%. Every year government regulation increases at the federal, state, and local level, increasing the SG&A of a company. Inflation tends to increase the cost of creating a product faster than the price can increases to compensate due to competitive forces. For example, healthcare costs increase faster than inflation. In order to control for these factors and uncertainty a Monte Carlo simulation can be used to estimate the joint probability distribution of all modeled variables. In this project we execute a Monte Carlo simulation for the capital budget project.

The Monte Carlo simulation will be based on 500 lifetimes. Variable costs and the price of the project will be based on a triangular distribution with drift. SG&A percentage will be based on a normal distribution with drift. The drift term for SG&A models regulatory costs increases and other overhead increases over time. The Monte Carlo simulation will be based on the demand optimized capital budget results.

**Basic requirements of the report:**

1) A short description of the company assigned to the student is required. The description should be no longer that one page, double spaced, 11 point type, Garamond font. Give the reader key details of what the company does and how it performs, without boring them with details about the founding date, the address, and other needless information that can be quickly referenced but has no bearing on the sales forecast. You may copy this from the prior report, incorporating any feedback from the professor.

2) Table the distribution parameters of each of the modeled variables. Give a short definition of each of the distributions used in the analysis; uniform, triangular, normal, and discuss the drift term and what the drift term models.

3) This Monte Carlo simulation assumes that the parameter distributions are independent. Explain why that is the case. Also include a discussion on what variables might not be independent and how the lack of independence could be modeled in the simulation.

4) Table the results of the NPV’s of the various estimates; mean, min, max, ect. Discuss the results and compare to the straight estimate from the previous project.

5) Create a downside risk curve of the project and discuss the interpretation of this plot. Create a table of the frequency.

6) Discuss the risk of the project relative to the CV and standard deviation of the NPV’s. Discuss the selection criteria for capital projects and how this project fits into the selection criteria.

7) All tables and plots, except the working tables, must be integrated in the text and labeled as Table 1, Table 2, or Figure 1, Figure 2 ect.

8) Working tables should be labeled and included in the appendix as indicated in the videos.

**Remember, you are building a portfolio of projects and work examples that can be used in the interview process, not just creating a report for a grade. While the projects will give you many marketable skills in Excel, the ability to clearly communicate your findings is another marketable skill that can only be demonstrated through the writing of your report.**