FE – 620 Pricing and Hedging

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Overview

For our project, we will be using the Black-Scholes model to price American Options. This will involve using R to collect data, develop an algorithmic model, and finally comparing the results of our model to real option prices. The data will be exported from Yahoo Finance using the quantmod library in R. The steps below are specifics tasks and assignments with an expected timeline.

Step 1: Data Collection

Team Lead = Anantha

Deadline October 20th

Three datasets will be collected.

1.) Daily Stock prices for Tesla over the past three years
2.) Call and Put option prices (three years)
3.) T-Bill Rate

The T-Bill rate will be important to analyze the risk-free rate.

Step 2: Data Preparation

Team Lead = Anantha

Deadline October 20th

1.) Calculate the Log Returns & Volatility.
2.) Generate QQ Plot

Step 3: Model Development

Team Lead = Riley

Deadline = October 20th

1.) Write R code to calculate the price of call and options
2.) Write R code to calculate option Greeks

Step 4 Sensitivity Analysis – Moksh & Riley

Team Lead = Moksh & Riley

Deadline October 27th

1.) Create an analysis to show the relationship between the variable inputs (time to duration, volatility, .. etc.), and option price.

The sensitivity analysis will be especially helpful to discuss the risk of the option in relationship to many different factors.

Step 5: Model Deployment

Team Lead = Saboura

Deadline October 27th

1.) Apply the developed model by using the data collected. A new column will be created which will be the "predicted" price for call and put options.

Step 6: Model Validation - Saboura

Team Lead = Saboura

Deadline November 3rd

1.) How does this model perform? Compare the predicted values to the actual option prices. This can be completed by using a scatter plot. Additionally, a simple linear regression can be used to generate an R^2.

Step 7: Hedging example

Team Lead = Moksh & Riley

Deadline November 3rd

1.) Use the model develop to creating a hedging strategy.

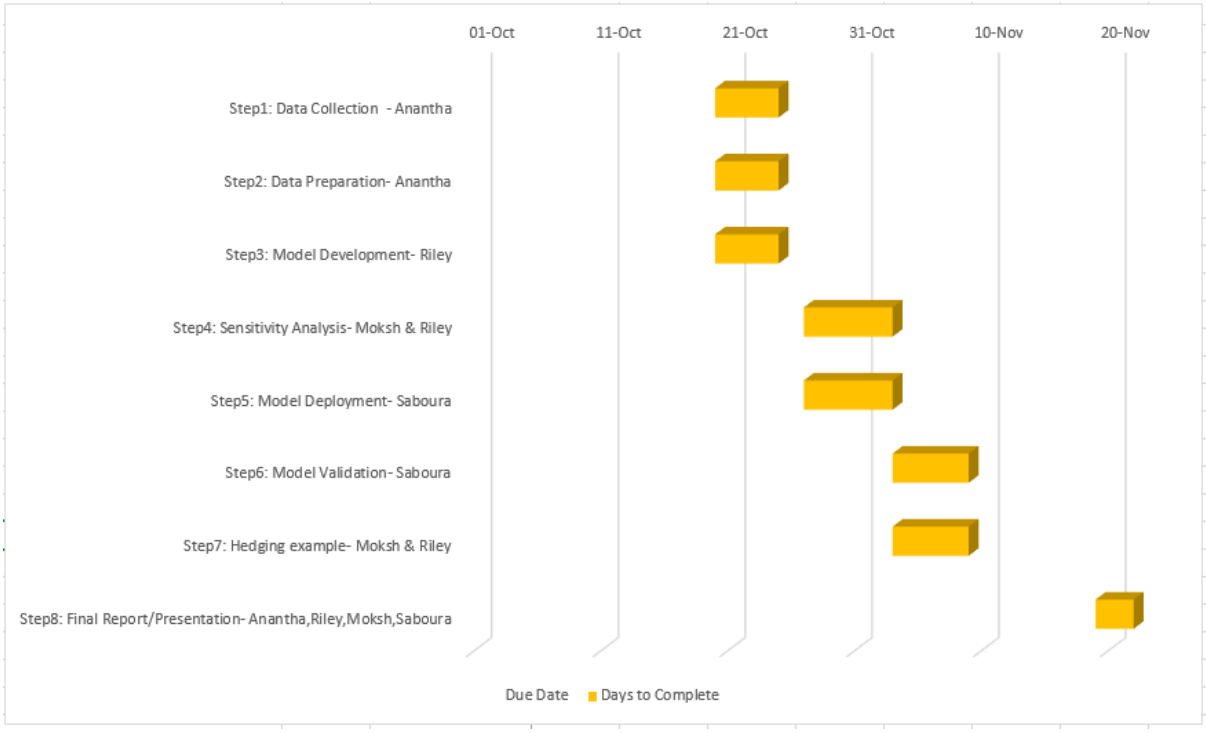
Step 8: Create a final Report

Team Lead = Anantha & Saboura

Deadline November 19th

1.) Using the analysis provided, and graphs write a final report. Although we have dedicated team leaders, this will also be a team effort!

Final Due Date = 12/8/2021



Task	Due Date	Days to Complete
Step1: Data Collection - Anantha	20-Oct	5
Step2: Data Preparation- Anantha	20-Oct	5
Step3: Model Development- Riley	20-Oct	5
Step4: Sensitivity Analysis- Moksh & Riley	27-Oct	7
Step5: Model Deployment- Saboura	27-Oct	7
Step6: Model Validation- Saboura	03-Nov	6
Step7: Hedging example- Moksh & Riley	03-Nov	6
Step8: Final Report/Presentation- Anantha,Riley,Moksh,Saboura	19-Nov	16