ISYE 6767 – Pedro Henrique Ribeiro Pinto

Interim Project Report

Implementing a dynamic delta hedging strategy.

1. Project Purpose:

The purpose of this project was to implement a Dynamic Delta Hedging strategy for European Options in C++. Delta Hedging is a great strategy for trying to create a neutral portfolio to minimize risk exposure.

2. Project Structure:

To run this program, you need to have a C++11 compiler installed as well as the *boost* and *quantlib* libraries.

Folder Structure:

- /bin: compiled executable files
- /data: input data files for Part II
- /doc: documentation files
- /include: .h header files
- /results: output csv files
- /src: .cpp files
- makefile: makefile to compile and run the programs

If you are using a Mac, these are the commands to compile and run the program:

```
make (compile main file)

make run (run main file)

make compile_test (compile unit test)

make run_test (run compiled unit test)
```

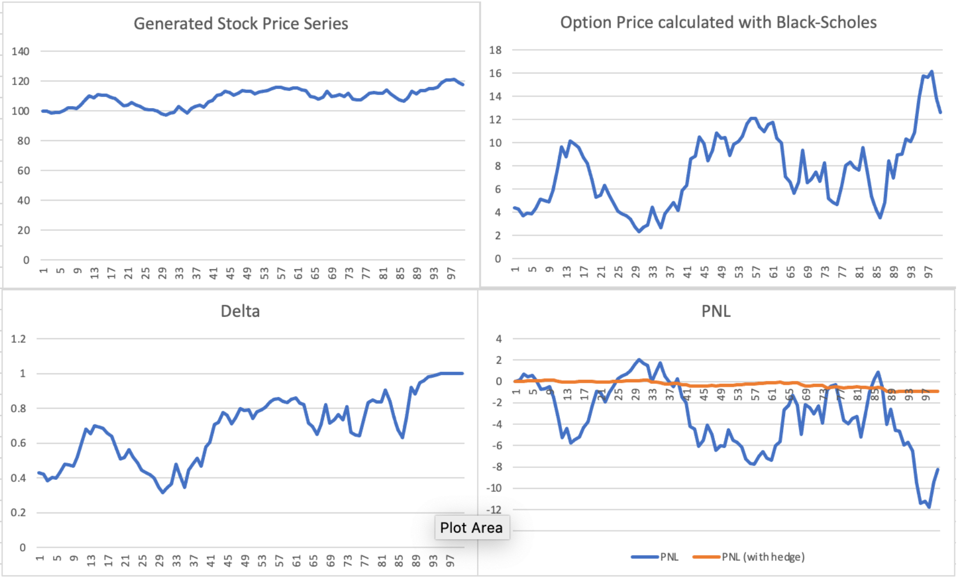
3. C++ Classes:

For this project, I implemented 3 main classes:

- option: this is a generic option class
- black_scholes: this class inherits the option class and adds functionality specific to the black scholes model
- stock: this class was implemented to generate stock prices using the following formula:

$$S_{t+\Delta t} = S_t + \mu S_t \Delta t + \sigma S_t \sqrt{\Delta t} Z_t,$$

4. Output Analysis:
   a. For Part I of the project, I implemented the hedging strategy 1000 different times. The outputs can be found in the results folder. Here are the plots for one of those strategies:



   b. The output for Part II is also in the results folder.