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% FRE 6251 Numerical and Simulation Techniques in Finance

% Assignment #1

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Brief summary of Assignment #1:

(1). My simulation has two matlab files, one is a function called “ AsianOption(S, K, T, r, sigma, n, m) ”, and other one is matlab script file called “AsianOptionMCS.m”.

The function AsianOption() simulates Monte Carlo method to calculate Asian Option Price and the standard deviation of the price of the n different paths.

I used example of a stock with following parameters and values:

So = Initial stock price

K = Strike price

r = Risk free rate

T = Maturity time

sigma = Stock Volatility

n = Number of path

m = Number of time-steps

So = 100;

K = 110;

r = 0.05;

sigma = 0.20;

T = 1;

n = 100;

m = 4;

For this simulation I just used 100 paths and 4 time steps in one year maturity. The option price I got is 3.66 and standard deviation of the 100 paths is 7.25.

(2). I also estimated the error with 95% confidence interval by using the formula [1.96 \* (σ/n0.5) ]. The estimated error I got is 1.42.

(3) I got the estimated error of 0.040149 when I used 100,000 numbers of paths. So, for one decimal digit of accuracy, we need 100, 000 paths with 4 time steps.

(4) For 3 digits of accuracy, we need about 1,000,000,000 paths since for each digit of accuracy Monte Carlo Simulation needs 100 time more points but I could not run my simulation for this large number because the computer gave me an error message saying that it exceed the max value allowed for a variable.

I included the results of running AsianOptionMCS.m