HW Problems for Assignment 1 - Lecture 1
Due 5 PM Tuesday, September 13, 2022

1. (15 Points) Case Study: Long Term Capital Management. Read Chapter 8 on Long Term Capital Management (LTCM) in the "Risk Takers" book: this is provided in the supplemental handout "Risk_Takers.pdf".

Provide a one paragraph (.5 pages) review of the chapter. Identify the major sources of risk which LTCM faced, and describe if LTCM was adequately hedged against the risk. In particular, state whether or not you think the downfall of LTCM was due to events beyond their control and/or particularly malicious behavior of their competitors.

2. (10 Points) BASEL. Read Chapter 15 and Chapter 16.1, 16.2 on the BASEL accords in "Risk Management and Financial Institutions", provided in the supplemental handout "Hull_BASEL.pdf". Answer the following questions

(a) Chapter 15, questions 2,5,11 and 15 (see pages 26-27).
(b) Chapter 16, questions 1 and 2 (see page 47).

Be succinct: for each of the questions, your answers should not exceed a few sentences.

3. (25 Points) Moving Average (MA), Exponentially Weighted MA and Garch Volatility Estimates. The file

"SPData.xlsx",

contains daily closing prices for the S&P 500 from August 2015 through July 2021. Column A contains the date, and column B contains the closing price. Data is sorted newest to oldest. In this exercise you will

(a) **(10 Points)** Write a program to produce plots of the historical annualized volatility using the moving average method with a look-back period of $n = 100$ days, and the exponentially weighted moving average method with $\lambda = 0.94$ and $\lambda = 0.97$.

You may take $\Delta = 1/252$ for converting to annualized numbers (for plotting). For the MA method, the first estimate is made using the 100 oldest daily log returns. For the EWMA method, you can set the initial variance as the sample variance over the oldest 100 days. Put the plots on the same figure and make sure to label the plots

(b) **(15 Points)** Write a program which will fit the daily return data to a GARCH(1,1) model. HOWEVER, to fit the model, use closing prices only between March 1, 2019 and February 28, 2020 (including the first and last date). Then, for the fitted model, plot $M = 100$ two month sample paths for the annualized daily volatility. How do the sample paths compare to the volatility estimates (MA and EWMA) over March and April 2020 obtained in part (a)?