QF609 (AY2023-2024): Group Assignment #1

February 16, 2024

Suppose that we have the following portfolio of positions as of 30/10/2023:

(a) a payer (i.e. pay fixed leg and receive float leg) SOFR swap with the following contract parameters:

- Notional: $100 million
- Starting Date: 30/10/2023
- Maturity: 10Y
- Strike: 4.2%
- FloatLeg Frequency: Annual
- FixedLeg Frequency: Annual

(b) $1 million in each of the four stocks: AAPL, MSFT, F (Ford Motor) and BAC (Bank of America)

An Excel workbook consisting of one-year of historical data (31/10/2022 - 30/10/2024) of the SOFR curve and the share prices of the four stocks above has been provided. Using the data, calculate the 1-day 95% VaR for the portfolio as of 30/10/2024 using each of the following models:

(a) Parametric VaR Model

(b) Monte Carlo VaR Model (under both full revaluation and risk-based approaches)

(c) Historical VaR Model (under both full revaluation and risk-based approaches)

For Monte Carlo VaR, you may assume the risk factor changes are normally distributed.