

## BAF504: Assignment 2

(Due: 6:00 pm. May. 2, 2024)

You are a portfolio manager and want to create a portfolio. Choose any three stocks which are traded in the same currency. market. Collect monthly returns of stock prices for 5 years at least. You need to have a risk-free rate for this assignment. Assume that a short-sale is not allowed. You may use any computer tool but do not hand in the data or the program code.

- a) What are the names of the stocks you have chosen? Mention the database to provide data.
- b) Find annualized arithmetic average and variance of each stock's excess return and variance-covariance matrix of 3 stocks' excess returns.
- c) Assume the expected rate of return and future standard deviation (SD) are same as historical arithmetic average and SD for each stock. Plot investment opportunity set for the three stocks. Explain briefly how you do it.
- d) Find the Tangent portfolio and Capital Allocation Line.
- e) By some reason, you should hold more than 30% of one stock among three stocks. (Select one stock and assign weight more of 30% to the stock. Then the weights for other stocks do not exceed 70%). How does the efficient frontier change? What is the optimal portfolio that maximizes the Sharpe ratio? What are the expected return, the standard deviation, and the Sharpe ratio of the optimal portfolio? Explain why you would have this portfolio.
- f) You are worried about a worst scenario. What is the (monthly) 5% VaR of the optimal portfolio in e) under the normality assumption? What is the 5% expected shortfall without the normality and explain how you compute it.
- g) Provide suggestions on the proportion of risk-free assets to invest in when you choose the optimal risky portfolio in e). You may consider three values for the coefficient of risk aversion: 2, 3.5 and 5.