

# THEORY OF FINANCE (20135)

## Assignment 2024

Produce a report that includes the R programme you have used and discusses all the following points

1. (5 points) Using resources publicly available on internet and a R programme to download monthly observations on the price of 30 components of the DJ30 index in 2023, the risk-free rate and the Fama/French 5 Research Factors over the sample 1990:1-2023:10.
2. (15 points) using the sample 1990:1-2005:06
  - (a) Analyze the performance of three portfolios: the market portfolio, an equally weighted portfolio invested in the Fama/French research factors and an equally weighted portfolio invested in the 30 selected stocks.
  - (b) Build and illustrate graphically the efficient frontier for the 30 stocks of interest.
  - (c) Estimate a Fama-French five factor model for all the stocks of interest and use the estimation results to generate a parsimoniously parameterized estimate of the variance-covariance matrix of the 30 risky assets.
  - (d) use the above estimate of the variance-covariance matrix to build the tangency portfolio in case no-short positions are allowed. Define this portfolio P30.
  - (e) Given a criterion of your choice select five of the 30 stocks and construct a portfolio using this five stock. Define this portfolio P5.
3. (10 points) using the sample 2006:1-2023:10
  - (a) evaluate the performance of the portfolio P30 against a chosen benchmark in the case in which portfolio weights are kept constant for the entire test sample
  - (b) evaluate the performance of the portfolio P5 against the market portfolio (i) in the case in which portfolio is reoptimized every month from 2006:1 onward (ii) in the case in which weights are kept fixed throughout the entire test sample.
4. (3 points) Given all available data up to 2023:10 provide an estimate of 1 per cent VaR in 2023:11 for Portfolios P30 and P5.