

Empirical Finance: Methods & Applications

Problem Set 1

Data

Collect the following data (e.g., Bloomberg, Datastream, Yahoo Finance)

- S&P500 Index (SP500)
- GBPUSD exchange rate (GBPUSD)
- US Federal Fund Rate (FFR).

Exercise 1

Using daily simple returns on all financial series

- a) Plot your simple returns,
- b) Compute summary statistics (mean, median, standard deviation, skewness, kurtosis, min, max, and first-order serial correlation),
- c) Report summary statistics in % per annum,
- d) Plot the histogram of each return series,
- e) Compute the variance-covariance matrix.

Exercise 2

Using daily log returns on all financial series

- a) Plot your simple returns,
- b) Compute summary statistics (e.g., mean, median, standard deviation, skewness, kurtosis, min, max, and first-order serial correlation),
- c) Report summary statistics in % per annum,
- d) Plot the histogram of each return series,
- e) Compute the variance-covariance matrix,
- d) Generate the scatter plot between log and simple returns.

Exercise 3

Using monthly simple returns on all financial series

- a) Plot your simple returns,
- b) Compute summary statistics (e.g., mean, median, standard deviation, skewness, kurtosis, min, max, and first-order serial correlation),
- c) Report summary statistics in % per annum,
- d) Plot the histogram of each return series,
- e) Compute the variance-covariance matrix.

Exercise 4

Using daily simple returns on all financial series

- a) Plot your simple returns,
- b) Compute summary statistics (e.g., mean, median, standard deviation, skewness, kurtosis, min, max, and first-order serial correlation),
- c) Report summary statistics in % per annum,
- d) Plot the histogram of each return series,
- e) Compute the variance-covariance matrix,
- d) Generate the scatter plot between log and simple returns.

Exercise 5

Using various distributions

- a) Sample 1000 draws from a Normal distribution with $\mu = 0$ and $\sigma = 1$. Plot the histogram of these draws.
- b) Sample 1000 draws from a Standardized t-distribution with $\mu = 0$, $\sigma = 1$, and $v = 5$. Plot the histogram of these draws.
- c) Sample 1000 draws from a Standardized t-distribution with $\mu = 0$, $\sigma = 1$, and $v = 30$. Plot the histogram of these draws.
- d) Sample 1000 draws from a Standardized skewed t-distribution with $\mu = 0$, $\sigma = 1$, $v = 5$, and $\xi = 0.5$. Plot the histogram of these draws.
- e) Sample 1000 draws from a Standardized skewed t-distribution with $\mu = 0$, $\sigma = 1$, $v = 5$, and $\xi = 2$. Plot the histogram of these draws.