

Assignment 3

1. Consider the daily stock returns of Apple from January 2020 to February 2023. The price data can be obtained by using R package quantmod.

- a. Compute the sample mean, standard deviation, skewness and excess kurtosis of the log returns r_t .
- b. Estimate the mean and standard deviation of the simple return R_t by assuming the log returns r_t follow a normal distribution $r_t \sim N(\mu, \sigma^2)$.
- c. Compute the sample mean and the sample standard deviation of the simple return R_t . Compare the results of (b) and (c).
- d. Find the kernel density estimator and normal density estimator for the log return r_t and the simple return R_t , respectively. Compare the empirical kernel density and normal density for r_t and R_t .

Plot the two estimated densities on the same graph.(see Page 21 Figure 1.4 in the textbook)

2. Consider the daily stock returns of Taiwan Semiconductor Manufacturing from January 2020 to February 2023. The price data can be obtained by using R package quantmod.

- a. Compute the sample mean, standard deviation, skewness and excess kurtosis of the log returns r_t .
- b. Estimate the mean and standard deviation of the simple return R_t by assuming the log returns r_t follow a normal distribution $r_t \sim N(\mu, \sigma^2)$.
- c. Compute the sample mean and the sample standard deviation of the simple return R_t . Compare the results of (b) and (c).
- d. Find the kernel density estimator and normal density estimator for the log return r_t and the simple return R_t , respectively. Compare the empirical kernel density and normal density for r_t and R_t .

Plot the two estimated densities on the same graph.(see Page 21 Figure 1.4 in the textbook)