

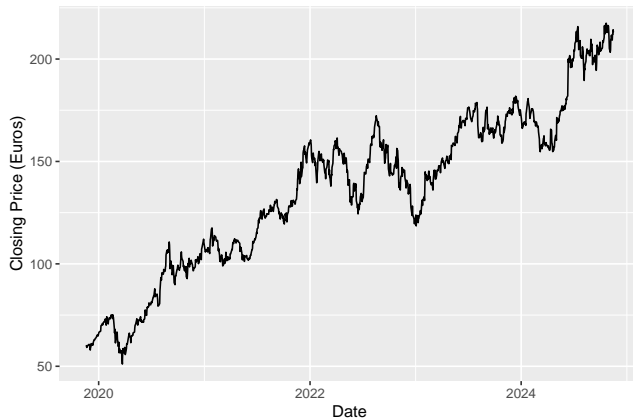
Probability and Statistics I

23. Statistics and their Distributions

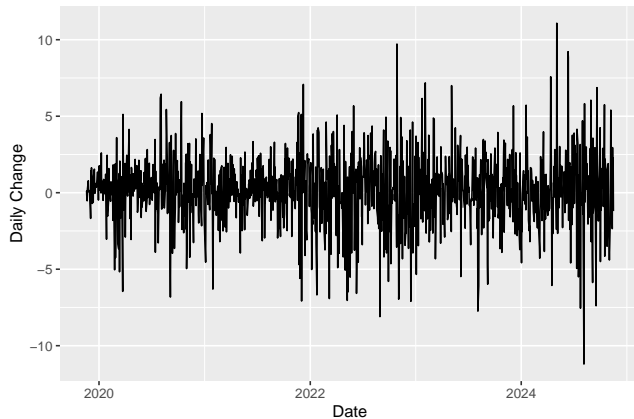
Chapter 5 Summary Exercise



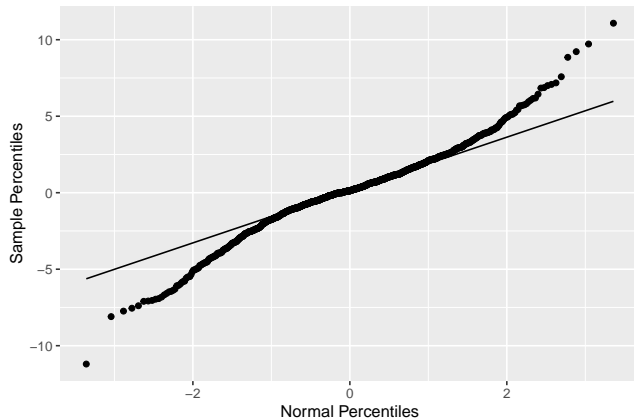
Daily Closing Price Nov 2019 – Nov 2024



Daily Change in Closing Price Nov 2019 – Nov 2024



Daily Change in Closing Price Nov 2019 – Nov 2024



Daily Change in Closing Price Nov 2019 – Nov 2024

Summary statistics:

- Mean: 0.1202
- Variance: 5.2372
- Std. Deviation: 2.2885

Example 23.1

Suppose that the change in the stock price per day is normal with constant mean and variance.

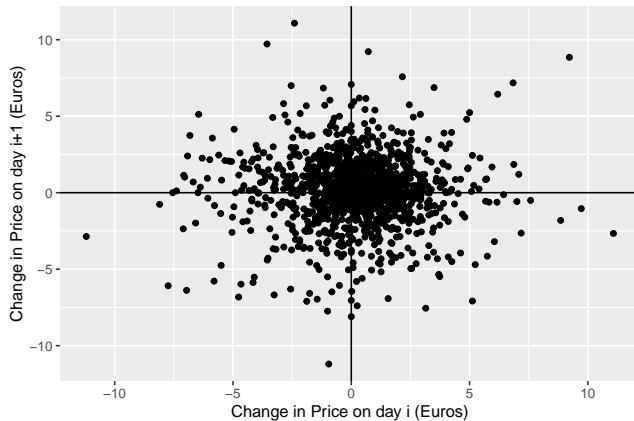
- a) What is the probability that the stock price increases on a randomly selected day?
- b) What is the probability that the stock price decreases on a randomly selected day?
- c) Suppose that you buy stock on 10 randomly selected days and sell them back one day later each time.
 - i) What is your expected gain/loss?
 - ii) What is the probability that the stock price increases on at least half of the days?
 - iii) What is the probability that you lose money on at least half of the days?

Can you beat the system?

Can you beat the system?

Suppose that you buy stock only on the day after a large increase.
Does this improve your chance of making a profit?

Daily Change in Closing Price Nov 2019 – Nov 2024



Daily Change in Closing Price Nov 2019 – Nov 2024

Summary statistics:

- Mean: 0.1202
- Variance: 5.2413
- Std. Deviation: 2.2894
- Covariance: 0.0412

Example 23.2

Suppose that the changes in the stock price for one day and the next are bivariate normal with constant mean, variance, and correlation.

- a) What is the distribution of the stock price on a randomly selected day *given that the price increased by $d = 5$ euros the day before?*
- b) What is the probability that the stock price increases on a randomly selected day *given that the price increased by $d = 5$ euros the day before?*
- c) What is the probability that the stock price decreases on a randomly selected day *given that the price increased by $d = 5$ euros the day before?*

Example 23.2 ctd

Suppose that the changes in the stock price for one day and the next are bivariate normal with constant mean, variance, and correlation.

- d) Suppose that you buy stock on 10 days selected at random from the days *given that the price increased by $d = 5$ euros the day before* and sell them back one day later each time.
 - i) What is your expected profit/loss?
 - ii) What is the probability that you make a profit on at least half of the days?
 - iii) What is the probability that you lose money on at least half of the days?