

Assignment 1

The files TESLA.xlsx (excel format) and TESLA.txt (text format) contain daily data on prices of TESLA stock from 2019/01/02 to 2021/12/30. Use the SAS code provided for Assignment 1 or your own code to perform the following analysis.

Examine the daily close prices and answer the following questions:

1. Define the random walk process.
2. Does the time series of daily TESLA prices display a trend?
3. Given your answer to the first question, do TESLA prices behave like a stationary process or rather like a random walk?
4. Does the return series, defined as $\text{return}(t) = \log p(t) - \log p(t-1)$ have a trend?
5. What are the differences between the behavior of prices and returns?
6. Define “volatility clustering”.
7. Comment on the patterns in return and prices between 2020/01/29 and 2020/03/13 – what do you observe?
8. Are the TESLA returns normally distributed? Explain and describe all evidence from the output provided by the summary statistics and figures (histogram, qq-plot, quantiles)
9. Write the formula of the AR(1) process.
10. Explain the computer output and describe all evidence along the following lines:
 - 10.1 what are the estimated marginal mean and variance of returns? Is the mean return statistically significant? – write the statistic for testing the hypothesis: “mean return = 0”
 - 10.2 Are the returns serially correlated? Is the autoregressive coefficient of the estimated AR(1) model statistically significant? What is the estimated variance of the error term of the AR(1) model?
 - 10.3 What is the efficient market hypothesis?
 - 10.4 Is your AR(1) estimation result consistent with the efficient market hypothesis? Explain why yes or not.