universität innsbruck

Institut für Banken
und Finanzen

Assignment 2

UE Methods of Empirical Finance (Seminar)

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Winter term 2019/2020

Your task is to write a scientific report (maximum eight pages) consisting of the three parts, which represent three different tasks, as outlined below in *teams of two*.

Part 1: Regression Analysis

Your task in this part is to apply regression analysis using the data provided in `russell3000_data.csv` from Assignment 1.

- Familiarise yourself with the slides on regression analysis provided on the course webpage.
- Develop *one hypothesis* that could be tested with the data set at hand (this could be a hypothesis you already worked on in Assignment 1).
- Test your hypothesis using a *multivariate* regression model and briefly describe your model and the included variables. What variables did you include in the model and why?
- Interpret your results.

(20 points)

Part 2: Time Series Simulations

Your task in this part is to *generate stochastic processes* in order to become familiar with those processes and techniques. There are no guidelines for parameter selection – try different specifications; the length of the simulated time series should vary between 200 and 1000 observations.

Potential simulation candidates are i) *white noise*, ii) simple *random walks*, iii) *AR(1)* or *AR(2)* processes, iv) *MA(1)* or *MA(2)* processes, and v) *ARMA(p,q)* processes.

Pick two of the processes you simulated (different ones, at best) and describe their properties using autocorrelation and partial autocorrelation function plots. Try identifying the model/process from the generated data.

(15 points)

Part 3: Financial Time Series

Your task in this part is to analyze financial time series – prices and returns – of a single stock. Select any stock for which daily price data is available for the most current five years and to write a report based on your analyses (see below).[1] Download your data from a reliable source, e.g. Bloomberg, Datastream[2] – but Yahoo Finance is also okay.

- Descriptive statistics

    - Calculate log-returns; plot prices and returns; calculate and present summary statistics on prices and returns. Describe the time series and think about potentially interesting properties.

- Time series analysis

    - Run tests for the stationarity (prices and returns) and interpret the results. Plot autocorrelation and partial autocorrelation function of the stationary time series. Test several univariate time series processes and select the process that best explains your data. (Compute and plot the resulting residuals and test whether they are white noise.)[3]

(30 points)

Important: Make sure to use a statistical software package which allows you to write scripts and *document* in a script how you solved the assignment, i.e. how you loaded and manipulated the data, how you calculated descriptive statistics and prepared figures, how you checked normality assumptions for your relevant variables, and how you ran the respective statistical tests. *Use comments to make it easy to understand your script and make sure your results are reproducible.*

Submission:
You are expected to hand in *both* a report as outlined above (`.pdf`) as well as your script (e.g. `.R`, `.do`, etc.) to be able to reproduce your results.

Submission deadline: January 30, 2020, 23:59 UTC+1 (via submission folder on OLAT)
File format for the report: .pdf
File name for the report: Surname1_Surname2_Assignment1.pdf
File name for the script: Surname1_Surname2_Assignment1.*

Maximum number of points: 65

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[1]Be creative in selecting your asset, there are other companies than Google, Apple, Microsoft, etc.

[2]You can use the terminals at the Department of Banking and Finance (Sowi building, 4th floor, room o.4.04).

[3]The part in parentheses is voluntary – but it might be an interesting exercise and residual analysis is something you would very often do not only in time series analyses but also when applying regression analysis in general.