

Series 4

Introduction to Computational Finance

return no later than March 24

1 Time average

Let be the following artificial time series:

```
set.seed(0);  
x=100+cumsum(0.5-runif(1000));
```

Draw the simple moving average for $N = 100$ and the exponential moving averages for $\alpha = 2/(N + 1)$, $\alpha = 0.1$ and $\alpha = 0.01$.

Observe the time shift depending on the value of α and answer the following questions:

- What can be said regarding the case $\alpha = 0.1$ compared to $\alpha = 0.01$?
- What about $\alpha = 2/(N + 1)$?

2 Scaling law

Using the data provided in last series 3 (EUR/USD, tick-by-tick, from January 1st to March 1st 2012), compute the number of directional changes for different scales δ .

Draw a log-log plot of the number of directional changes as a function of the scale δ . What do you observe ?

Report

Each student is expected to give back a personal work consisting of a report in PDF format presenting his/her results and answering the questions of the exercise, as well as the script used to generate the presented results. Both report and script have to be uploaded on Moodle (IFC/Series4).