Series 5

Introduction to Computational Finance

return no later than March 31

Modeling a LOB - Maslov's model

Implement Maslov's model, which despite its simplicity allows reproducing interesting statistical features. The model:

- one trader at each time step;
- buys or sells with probability 0.5;
- issues a *market order* $x = (\text{bid/ask}, \sigma, t_x)$ with probability $1 - r$;
- otherwise issues a *limit order* $x = (p_x, \sigma, t_x)$ with $p_x = p' - K$ (if buying order) or $p_x = p' + K$ (if selling order), p' being the last price paid;
- K is a random variable following some given distribution;
- no order cancellation is allowed.

The reference article presenting Maslov's model, entitled *Simple model of a limit order-driven market*, is available on Moodle.

Run the algorithm on 1000 iterations, considering $r = 0.5$, $K = 1$. With the simulated data:

- Plot the time series of the market, ask and bid prices p(t), a(t) and b(t).
- Plot the time series of returns and their distribution.
- Draw the autocorrelation plot of the return.

Using the plots, answer the following questions:

1. Are there any differences between the mid price and the market price?
2. What do you observe from the time series of the return?
3. Are there differences between the distribution of the return and the normal distribution?
4. What do you observe from the autocorrelation plot?

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/Series5).