

MTH 9879 Market Microstructure Models

Spring 2011

Homework 1

Assigned: February 1; Due: 6pm February 8. Late homework will not be accepted.

This homework is to be done by each student individually.

1. (0 points) Read Chapter 12 of Hasbrouck.

The Smith Farmer zero-intelligence model

1. (4 points) Using the provided functions in `SmithFarmer9879-1.R`, initialize the order book and add two orders to the (best) bid side of the book. The resulting book should have 3 orders at best bid and 1 order at best offer. Plot the resulting book shape.
2. (10 points) Reproduce Figure 3 of the lecture slides. Initialize the order book using `initializeBook5()` and run at least 100 simulations for various values of the quantity at the best bid, storing the mid prices after 100 order book events. Remember to include error bars with error computed as standard deviation of the mean. If you see an order book with large quantity at the bid and small quantity at the offer, what does it tell you about the future price?
3. (4 points) A derivatives quant explains (patiently) to you that asset prices are martingales (informally speaking that expected price changes are zero). Do you agree? How is your understanding consistent with the derivative quant's understanding?