The Stigler-Luckock model for a limit order book

Referee Report

September 3, 2019

This thesis studies an extension of a market quoting model where market participants place buy and sell orders randomly (using uniform distribution) by adding market makers. The model without market makers leads to large and unrealistic market spreads. Addition of market makers helps to remedy the situation depending on their arrival frequency. The case of having 40% of buyers, 40% sellers and 20% market makers leads to equilibrium.

The main contribution of the thesis is analysis of more complex trading strategies used by market makers, namely the ability to control the spread, volume or frequency of checking the inventory or frequency of changing the price. Several such models are analyzed using computer simulations. The graphical illustrations of the results are informative and nicely done. The obvious limitation of the thesis is that it does not give substantial analytical results, which is a shortcoming that the author of the thesis is well aware of. However, it seems that any analytical results are unrealistic to expect as the nature of the problem is too complicated.

As one possible point for consideration is the nature of the linear supply and demand functions used in the thesis (for instance on page 43). The linear supply and demand functions have appeared previously in the economic literature, for instance in paper Grossman, S. J., & Stiglitz, J. E. (1980). On the impossibility of informationally efficient markets. *The American economic review,* 70(3), 393-408. More specifically, Equation (8) in the paper is indeed a linear demand function with the convention that minus supply represents demand. It is a result of exponential utility maximization applied on normally distributed random variable. It would be interesting to see whether the uniform quoting strategy from the diploma thesis is connected to the linear demand from the above mentioned paper. I can imagine that this can be a consequence of the central limit theorem, but this certainly requires some deeper thinking.

Summary: The thesis satisfies conditions of a master thesis and I recommend that it is **accepted as such.** The thesis is well written and the author has proved the

competence of analytical thinking and simulation analysis. However, the lack of analytical results may be seen as a shortcoming of the work.

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