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Mysteries of Foreign Exchange Limit Order Books

Knowledge Transfer Network
Industrial Mathematics

The Limit Order Book

Over the last decade, electronic limit order trading [2] has come to be adopted by more than half of the world's financial markets [4]. As well as providing buyers and sellers alike with real-time access to "the ultimate microscopic level of description" [1], the widespread use of electronic limit order trading platforms has granted researchers access to a wealth of time-stamped trade data. Creating a useful model of limit order trading that exhibits similar properties to such data is arguably one of the main problems facing practitioners and academics in the field today.

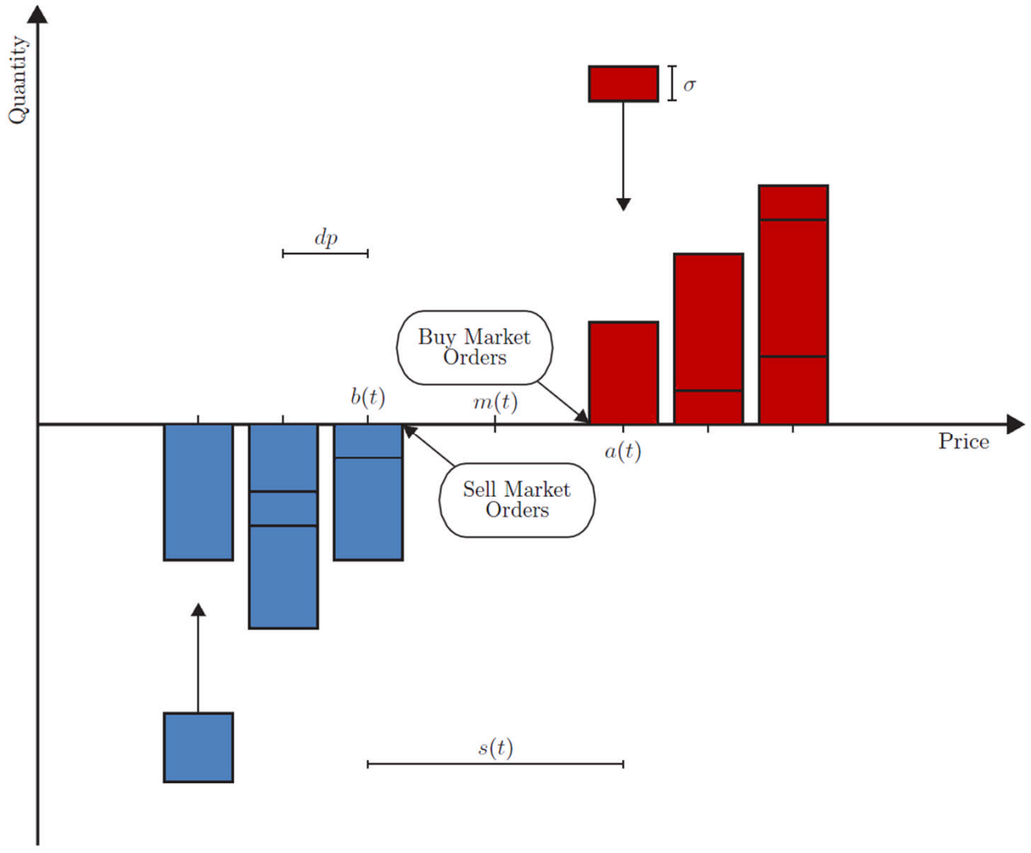
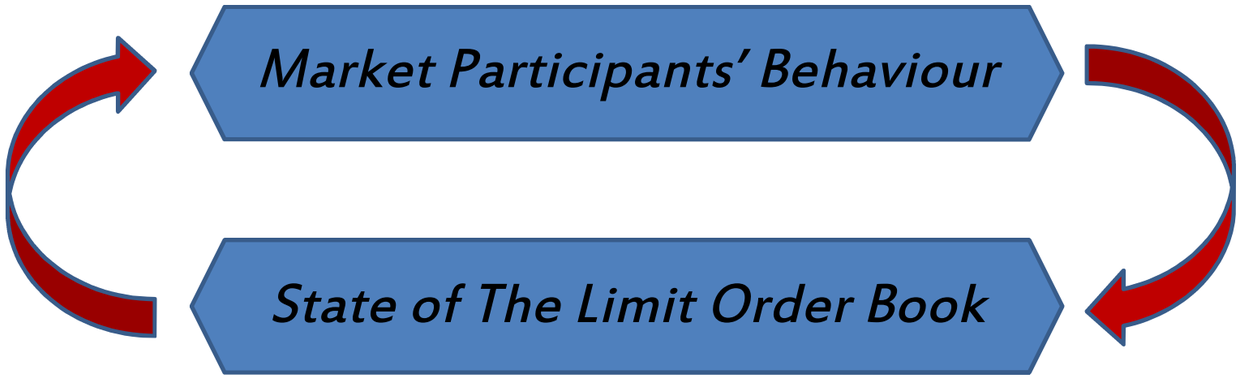


Figure 1: The main definitions from the limit order book



The Feedback Loop

The major difficulty with producing an effective model of limit order trading is the feedback loop between the state of the limit order book and the manner in which market participants interact with it. More precisely, it is not sufficient to produce a model which only details how order submissions and cancellations affect the state of the limit order book – instead, it is also necessary to acknowledge how the state of the limit order book also affects market participants' behaviour. This feedback loop, along with the evolution of ever more complex trading strategies by market participants, causes limit order book trade data to exhibit a number of unusual statistical properties

References

[1] J. Bouchaud, M. Mezard, M. Potters, *"Statistical Properties of Stock Order Books: Empirical Results and Models"*, Quant. Finance 2 (2001) 251-256.

[2] M. D. Gould, M. A. Porter, S. Williams, M. McDonald, D. J. Fenn, S. Howison, *"The Limit Order Book: A Survey"*, In Preparation (2010).

[3] M. D. Gould, M. A. Porter, S. Williams, M. McDonald, D. J. Fenn, S. Howison, *"Statistical Properties of The Limit Order Book"*, In Preparation (2010).

[4] I. Rosu, *"A Dynamic Model of the Limit Order Book"*, Review of Financial Studies 22 (2009), #11, 4601-4641.