Price Impact of Large Orders Using Hawkes Processes

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Abstract

In this paper we introduce a model to be used in the execution of large market orders in limit order books. We use a linear combination of self-exciting Hawkes processes to model asset-price dynamics, as done in [Bacry et al., 2013a] with the addition of a price-impact function that is concave in the order size. We introduce a criterion for a general price-impact function, which we then use to show how specification of a concave impact function affects order execution. With our framework we examine the immediate and permanent impacts of large orders, we look at the potential for price manipulation, and we show the effectiveness of strategies such as time-weighted average price (TWAP). Our model is such that price will depend on the balance between the intensities of the Hawkes process, which can be interpreted as a dependence on order-flow imbalance (OFI). Overall this paper contributes toward an ongoing discussion on price impact for models with Hawkes processes.

Keywords: *price-impact function, limit order books, execution of large orders, Hawkes processes.*
AMS Subject Codes: *60G55, 91B26, 91B70.*

References

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