Optimal order placement in limit order markets

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Abstract:
To execute a trade, participants in electronic equity markets may choose to submit limit orders or market orders across various exchanges where a stock is traded. This decision is influenced by the characteristics of the order flow and queue sizes in each limit order book, as well as the structure of transaction fees and rebates across exchanges. We propose a quantitative framework for studying this order placement problem by formulating it as a convex optimization problem. This formulation allows to study how the interplay between the state of order books, the fee structure, order flow properties and preferences of a trader determine the optimal placement decision. In the case of a single exchange, we derive an explicit solution for the optimal split between limit and market orders. For the general problem of order placement across multiple exchanges, we propose a stochastic algorithm for computing the optimal policy and study the sensitivity of the solution to various parameters using a numerical implementation of the algorithm.