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Optimal Order Execution Using Hidden Orders

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Abstract

Hidden orders are offered by many lit trading venues for participants to hide the true size of their orders. To help a risk-neutral trader executing a target volume to minimize the execution cost by benefitting from the setting of a limit order market allowing hidden orders, we propose a multi-stage dynamic programming model to determine the optimal trading strategy involving hidden orders. We consider two settings, where in the first setting the trader uses market and hidden orders, and in the second setting the trade uses limit and hidden orders in intermediate periods and market orders at the final stage. In both settings, we derive analytical solutions to the dynamic programming model under certain assumptions and discuss economic implications of our results. We use order-message data from NASDAQ to estimate the model parameters and demonstrate the generality of our assumptions.

Keywords: Hidden Order, Order Execution, Limit Order Market, Dynamic Programming
JEL classification: C61, D44, G11, G18

1. Introduction

The adoption of electronic trading systems has transformed financial markets into trading platforms with the limit order book as a dominant trading mechanism. In a limit order market, participants can submit market orders, which are filled immediately at the best available price. They can also submit limit orders with inbuilt price limits, and these limit orders will be displayed to other participants and wait for execution in the limit order book.

Several studies have found that exposing large limit orders could reveal the trading intention to other market participants, and hence adversely impact the market price. For example, on noticing a large limit buy order posted to the order book, market makers may sell less aggressively, and other buyers may perform undercutting by posting orders with higher limit bid prices. See, e.g., Esser and Mönch (2007); Buti and Rindi (2013). In addition, informed traders may prefer to use limit orders than market orders. So limit

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