

## Order Routing Impact on Information Leakage

### I. Outline and Proposal

It is well known that orderbook imbalance drives many trading strategies, particularly strategies that are high-frequency in nature<sup>[1]</sup>. It is clear why market participants, especially those who require large fills quickly, can be worried about how their activity negatively impacts the order book and thus their strategy. The question of whether to join the NBBO on an exchange or post the current NBB on the book of another exchange gives way to interesting analysis. If one were to have a merged view of all venue's books, then intuitively it would not matter where you post your bids, the only information leaked is the increase in demand at the NBB. However, I would like to further investigate how a venue's specific microstructure and design (speed bumps, order matching system, fees) can impact quoting behaviour on that venue's order book. In addition, we would also investigate how concepts such as opening and closing imbalance trading activities, as well as the depth of a venue's specific book can provide further insight to the proposed question.

### II. Methodology and Ideas for Approach

- i. Data Wrangling – The first step for this project is to recreate instances of “creating” or “joining” the NBB/NBO on different venues. To do this requires the usage of Python and TAQ data, together with careful design on how to recreate limit-order books per venue, and the consolidated book.
- ii. Metrics for Order Book Impact - To start analyzing the impact of NBB orders on a book, we will try to recreate current literature using our Python framework in attempt to find robust relationships between posting NBB bids and the price impact thereafter. For example, a study by Cont et al. suggests a linear relationship between order flow imbalance and price changes and an inverse relationship with the market depth. To test this, we would draw comparisons on new BBO creation impacts on securities with a deep order book, and that of securities with less depth.
- iii. Hypothesis Testing – Once we have a robust way for wrangling data and computing various execution related metrics, we can start testing hypothesis around the impact of order routing decisions and information leakage.

### III. References

1. Álvaro Cartea, Ryan Donnelly & Sebastian Jaimungal (2018) Enhancing trading strategies with order book signals, Applied Mathematical Finance, 25:1, 1-35, DOI: [10.1080/1350486X.2018.1434009](https://doi.org/10.1080/1350486X.2018.1434009)
2. <https://iextrading.com/developer/docs/#unofficial-libraries-and-integrations>
3. Rama Cont, Arseniy Kukanov, Sasha Stoikov, The Price Impact of Order Book Events, Journal of Financial Econometrics, Volume 12, Issue 1, Winter 2014, Pages 47–88,