

# Spoofing in Bitcoin Order Book

Jingrui Li<sup>1</sup>, Ruming Liu<sup>1</sup> Steve Yang<sup>1</sup>

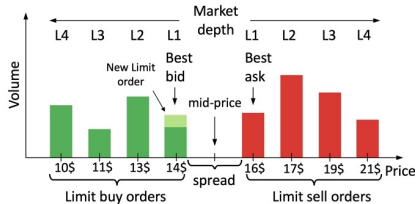
<sup>1</sup>School of Business, Stevens Institute of Technology.

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# Overview of Crypto Market and Manipulation

- Cryptocurrencies, worth over US\$2 trillion, has emerged as a new asset class.
- Market manipulation is one of the concern due to the lack of regulation.
- Crypto wash trading, MS (Cong et al. 2023)
- Is Bitcoin really untethered? JF (Griffin & Shams 2020)
- Rug pull of meme tokens in DEXs. (Li et al. 2022)
- Cryptocurrency pump-and-dump schemes. (Li et al. 2021)

# Spoofing Manipulation



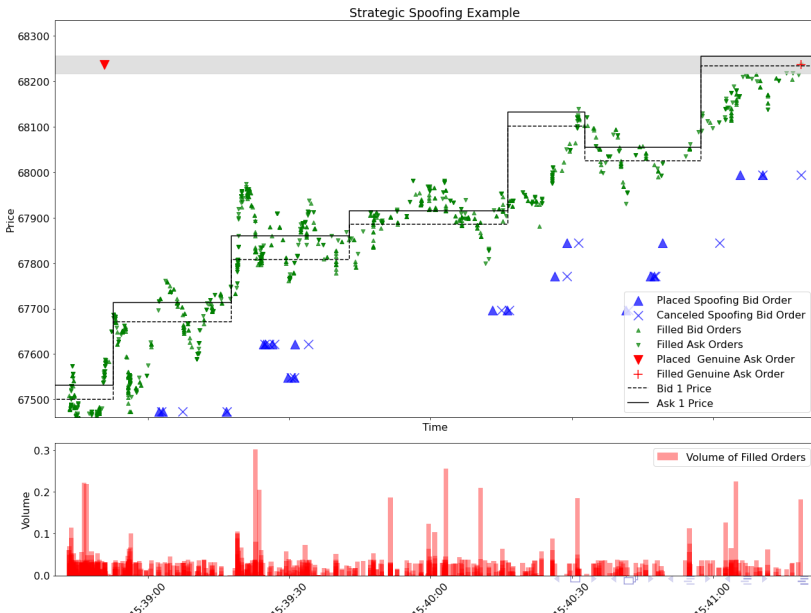
**Figure:** Limit Order Book Imbalance

- SEC: Spoofing the market is manipulating the price of a security by placing many orders on one side of the market, thus moving the price either up or down.
- CFTC Orders JPMorgan to Pay Record \$920 Million for Spoofing and Manipulation in 2020.

# Detection of Spoofing Order

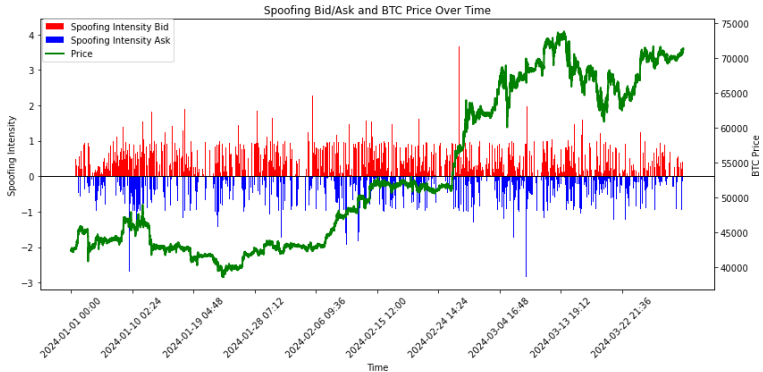
- Microstructure-based manipulation: Strategic behavior and performance of spoofing traders, JFM (Lee et al. 2013).
  - ① They detect spoofing trades by observing the order stream of each individual trader ID.
  - ② But their research relies on the trader ID.
- We follow Low-latency Trading, JFM (Hasbrouck & Saar 2013).
  - ① Our Bitcoin data is level 3 data, including all trades, fills, adds, cancels, and modifications of trades and quotes for transactions on Coinbase. We obtained the data from Kaiko.
  - ② We match **spoofing orders** of submission and cancellation from a same trader by the order size.
  - ③ At the same time, we match the **genuine order** if there is an **opposing order** that was placed before the spoofing began but gets filled just before the spoofing ends.

# Example of Spoofing Orders



# Spoofing Intensity

- We aggregate the spoofing orders we matched into two 1-minute level indicators called **bid spoofing intensity** (*BSI*) and **ask spoofing intensity** (*ASI*).
- *BSI* and *ASI* are the time-weighted average of the number of bid (ask) spoofing that occur within 1 minute.



# Test of Spoofing Intensity

- Detecting Layering and Spoofing in Markets (Do & Putniņš 2023)
  - ① They study court cases of spoofing manipulation and find:
  - ② Strategic spoofing involves an abnormally high rate of order cancellations.
  - ③ Phenomenon of “trades opposing quotes.”
- We test these two phenomena.
- Test 1: Abnormal Cancelled Bid Order( $ACB$ ): the number of bid orders that, if not canceled, would have been executed within the same minute of their cancellation. *Bid Spoofing*  $\uparrow \Rightarrow ACB \uparrow$
- Test 2: We find: when there is a high level of bid spoofing activity, seller-initiated ask orders are more likely to be executed.

# Main Tests and Results

- Bid (Ask) spoofing can push up (down) the contemporaneous and future market BTC price.
- Bid and Ask spoofing both deteriorate market quality (spread, Roll Measure, volume-synchronized probability of informed trading (*VPIN*)).
- The spoofing intensity makes price improvement of genuine orders.



Thank you!