A Cloaking Mechanism to Mitigate Market Manipulation

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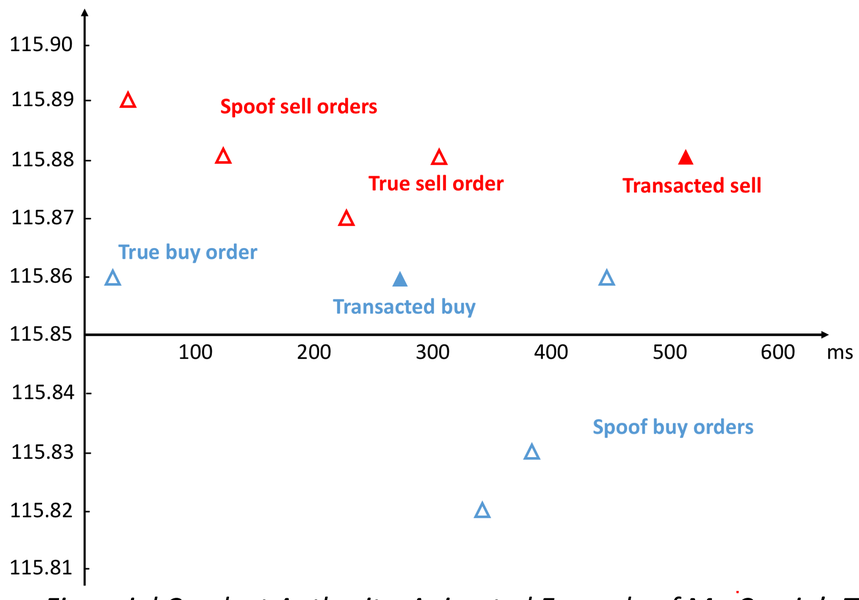
Motivation

Financial market manipulation refers to the practice of submitting spurious orders to mislead other traders' beliefs and make profits.

Detecting manipulation of each individual case is difficult:

- Search through massive order submissions and cancellations;
- Establish the manipulation intent behind trading activities.

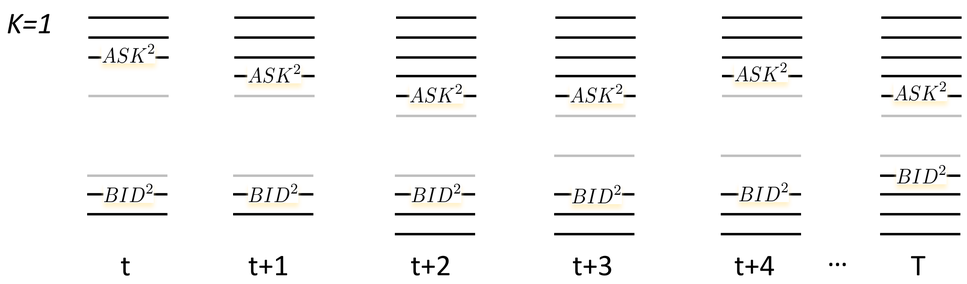


Source: Financial Conduct Authority, Animated Example of Mr. Coscia's Trading.

Question: Can we mitigate manipulation through a *market mechanism change*?

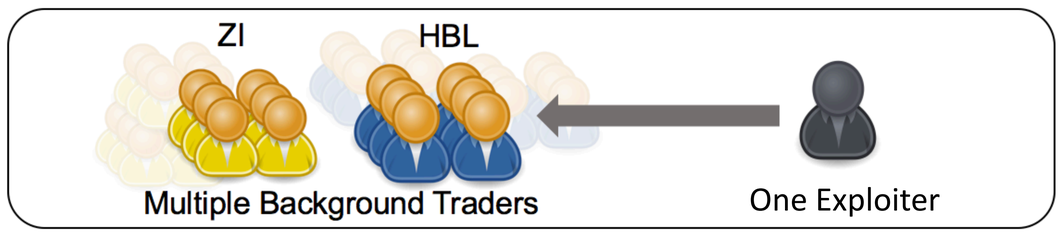
Idea: ***A cloaking mechanism*** that symmetrically hides a deterministic number of price levels *K* from inside of the book.

- Introduce risk and degrade influence of manipulation
- Preserve the usefulness of aggregated market information



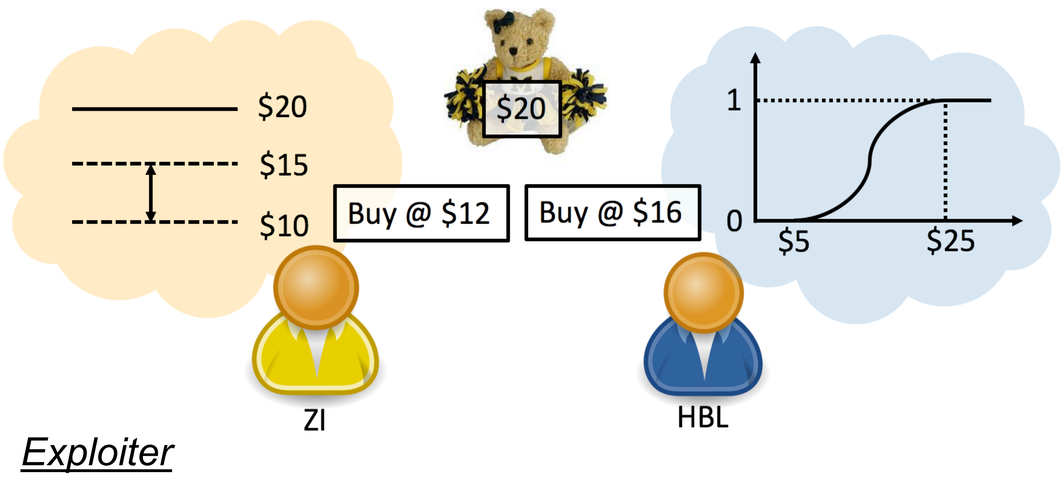
Agent-Based Market Model

Agent Composition



Background Traders [Wang & Wellman 2017]

- *Zero intelligence* (ZI) [Gode & Sunder 1993] bids based on valuation and a stochastic requested surplus.
- *Heuristic belief learning* (HBL) [Gjerstad & Dickhaut 1998] learns from the *exposed* order book to approximate the probability of an order being accepted and chooses a price to maximize expected surplus.



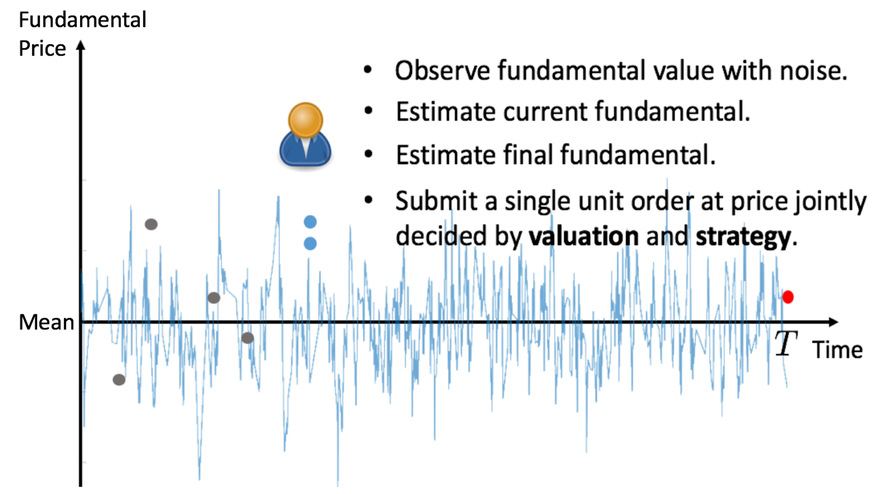
Exploiter

- Accepts any sell order at price lower than a certain threshold; manipulates or waits; accepts any buy orders at higher prices.
- "Safe" manipulation: maintains a large volume of buy orders at a tick behind *the best visible bid*, aiming to push price up.
- "Risky" manipulation: *probes* the market by submitting a series of orders at slightly higher prices to reveal the cloaked bids, and manipulate at a higher visible price.

Market Model

Market settings

- Fundamental shocks
- Observation noise
- Degree of cloaking *K*
- Presence of manipulation



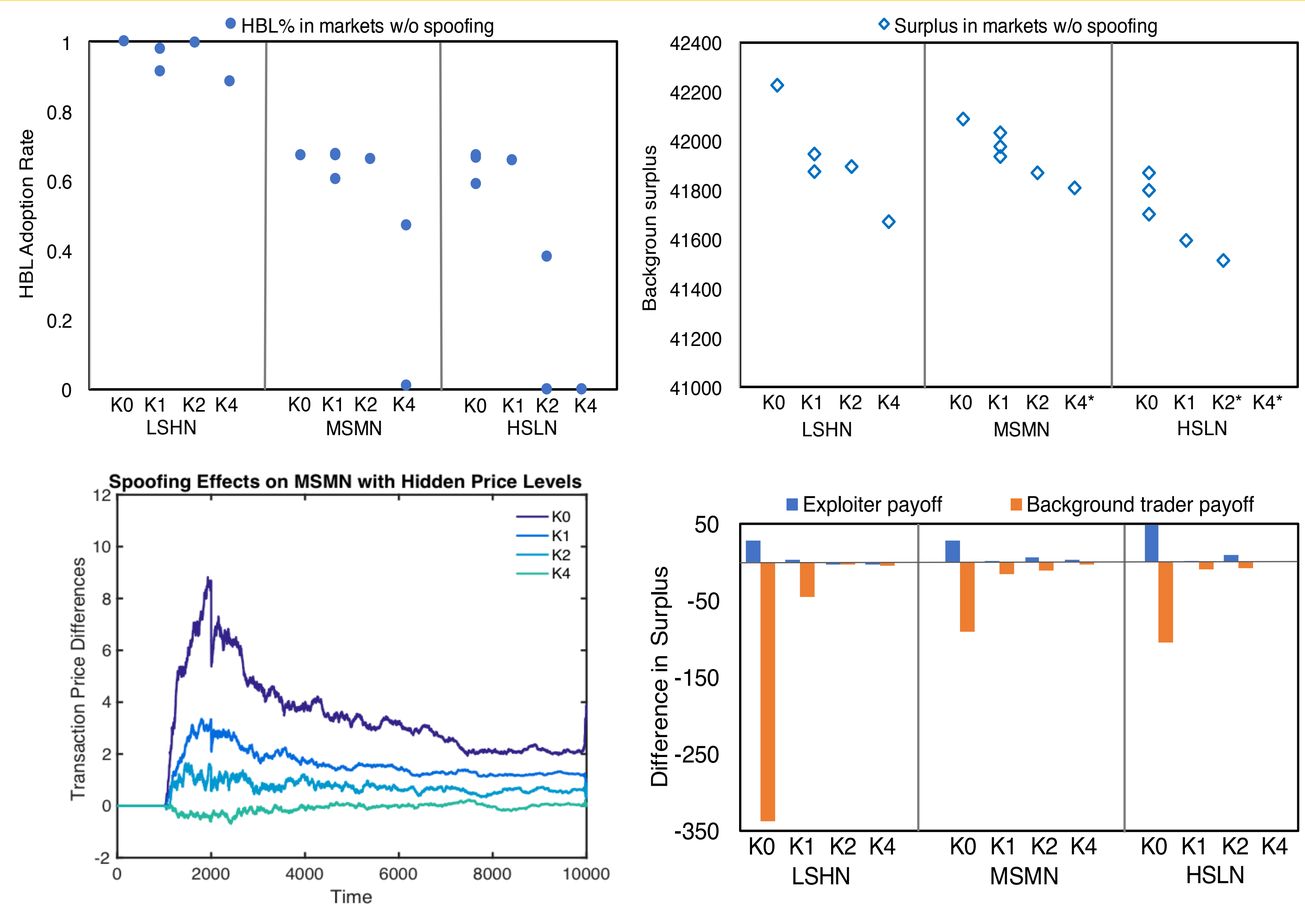
Experiments and Results

Cloaking impact on background traders

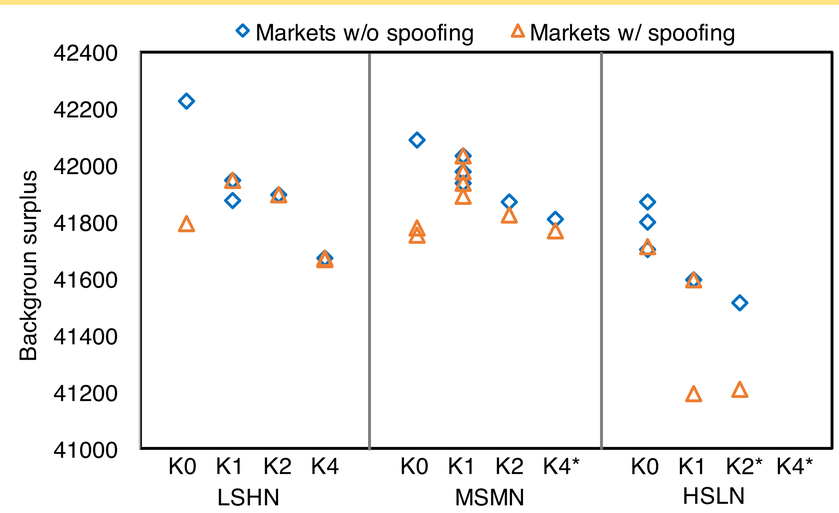
Cloaking impact on manipulation

→ Finding the optimal cloaking *K* → Exploring smarter manipulation strategy

Stage 1: Cloaking entails a tradeoff between preserving information and reducing the incentive to manipulate.



Stage 2: The benefit of cloaking's improved robustness to manipulation can outweigh its associated efficiency costs in markets with moderate shocks.



Stage 3: The effort and risk of probing a cloaking mechanism in highly dynamic markets usually exceed the gains.