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.

Towards Robust Learning-Based Trading Strategies

- Construct the dataset by selectively ignoring orders at certain price levels, particularly where spoof orders are likely to be placed.
- Adjust offer prices by a random offset to correct biases in learned price beliefs either caused by manipulation or the intrinsic limitation built in the belief function.

Empirical Game-theoretic Analysis

Background Traders [Wang & Wellman 2017]

- 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.

Spoofers

- 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.

HBL with Price Level Blocking

Markets that populate with learning agents who correctly block orders at the second price level can achieve much larger HBL proportions and consequently, higher total surplus in equilibrium!

In the face of manipulation, markets where trading agents are provided options of HBL with price offsets remain to achieve larger HBL adoption rates and higher surplus!

Manipulation can effectively mislead learning traders’ pricing beliefs, and thus decrease HBL proportion and background-trader surplus!