Selected Spoofing Analyses

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VEGA ECONOMICS

Example Definition of "Spoof Sequence"

"Spoof Sequence"

"Spoof Orders"

A fully-displayed resting large order or order group placed in the first five levels of the visible order book on one side of the market.

"Opposite Orders"

An iceberg order (of any size) resting in the first five levels of the order book on the other side of the market at some point during the pendency of the Spoof Orders.

This definition:

Is:

- Restricted to orders in the first five levels of the visible order book when placed.

Is not:

- Restricted to whether the Opposite Orders were placed before or after the Spoof Orders.
- Restricted to whether the Spoof Orders or the Opposite Orders were filled.

Are Differences in the Fill Ratio and Median Duration Indicative of Intent to Spoof?

	Spoof Orders	Opposite Orders
Iceberg	No	Yes
Fully Displayed	Yes	No
Refill	No	Yes

Academic literature has shown that iceberg orders are associated with different probabilities of full execution, different average time to completion, and different market price impact.

Given the unique features of iceberg orders, why would one expect the fill ratio and median duration of Spoof Orders and Opposite Orders to be similar?

Can the Market Be Harmed in Aggregate?

> "Futures trading is a zero-sum game – for every winner, there must be a loser.

-Olson, Erika S. Zero-Sum Game: The Rise of the World's Largest Derivatives Exchange. *John Wiley & Sons*, 2010.

In certain circumstances, when trades occur either within or outside the quotes, a better measure of trading cost is the percentage effective half spread.

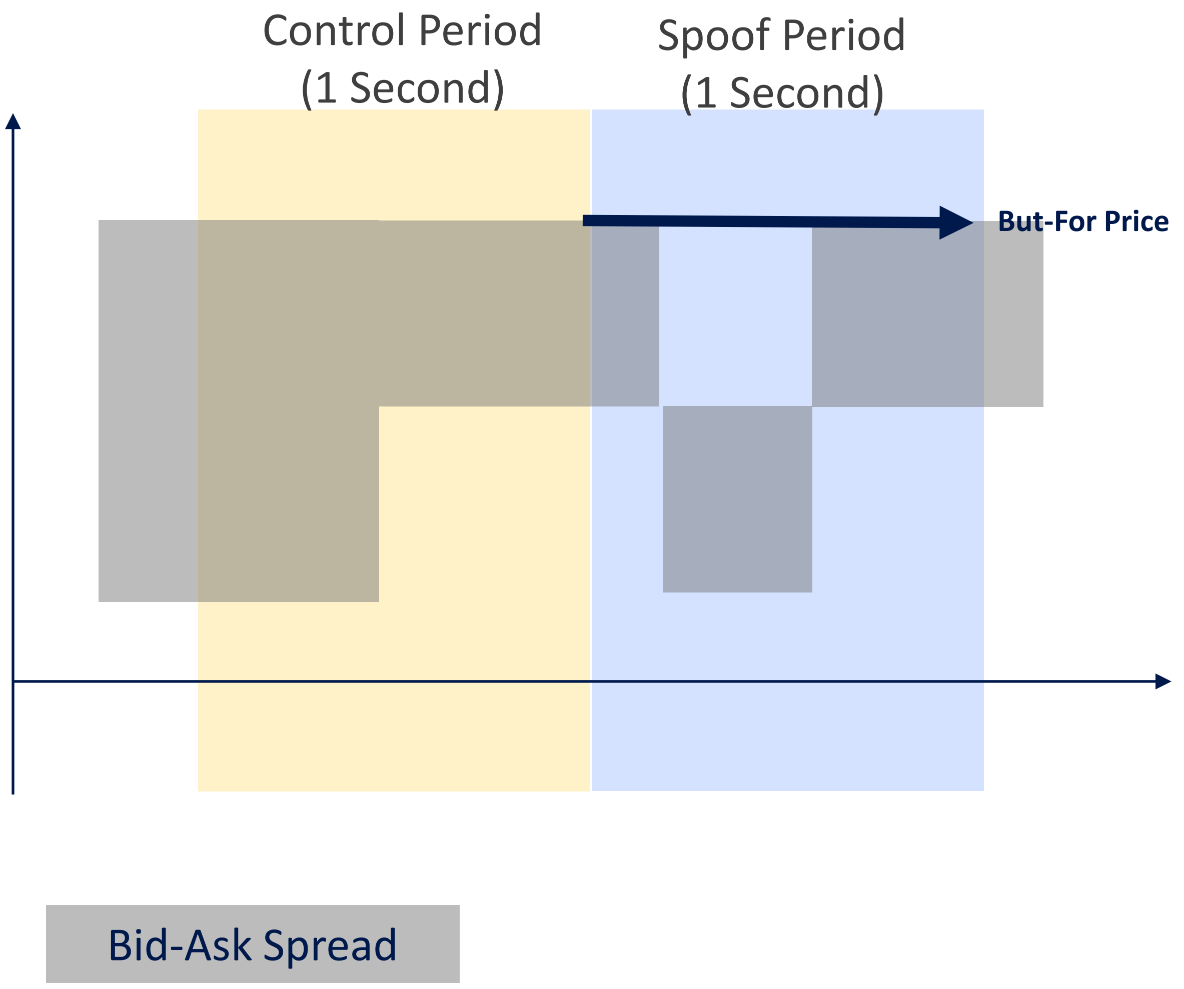
Specifically, the effective spread can be viewed as an estimate of the execution **cost** paid by the trader and the gross **revenue** earned by the liquidity provider, and they add up to zero.

Factors that Need to Be Considered in Estimating the Price Impact of Purported Spoof Sequences

Price Factors

- Order Imbalance
- Indicator of Buyer-Initiated Last Trade
- Sign of the Trade
- Volume of Trades
- Fair Values of the Contracts

Illustration of an Example Market Harm Calculation



In this example method, when the purported spoofing occurred on the sell side, the but-for price is assumed to be the best ask price from the control period, and the market harm is the sum of the difference between but-for price and the actual transacted price across all trades in the spoof period.

Critical Assumptions in This Example Method

The calculation only includes one side of the market. In this episode, only sellers are included.

But-for price would be the best bid (ask) price prior to sell-side (buy-side) spoof period regardless whether seller (buyer) crosses the spread to sell (buy).

It is assumed that the but-for quantity available at the but-for prices is unlimited.

Experts should evaluate all these modelling assumptions carefully and test the sensitivity of the calculation's results under alternative modelling assumptions.

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