

Motivation for Measuring OFI at Multiple Depth Levels

Measuring order flow imbalance (OFI) at multiple depth levels provides a more comprehensive view of supply and demand across the order book. While OFI at the best bid and ask reflects immediate price pressure, deeper levels reveal hidden liquidity and potential shifts in market pressure that have not yet reached the top of the book. This approach:

- Captures a fuller picture of liquidity conditions.
- Detects imbalances that may drive future price movements.
- Reduces sensitivity to microstructure noise at the best quotes.
- Enables better modeling of price resilience and cross-asset impact.

Why Lasso Regression is Used Instead of OLS for Cross-Impact Estimation

Lasso regression is preferred over ordinary least squares (OLS) because it is well-suited for high-dimensional settings where many predictors may be irrelevant. Cross-impact matrices are typically sparse, as most assets do not meaningfully affect others. Lasso regularization shrinks insignificant coefficients to zero, leading to:

- A sparser, more interpretable model.
- Reduced risk of overfitting in the presence of many correlated predictors.
- More stable estimates when multicollinearity exists.

Why OFI is a Better Predictor of Short-Term Returns than Trade Volume

OFI provides a stronger signal for short-term price movements because it reflects net supply and demand pressure rather than simply trading activity. Unlike trade volume, which can be high even when buy and sell pressure are balanced, OFI captures directional pressure. It reflects:

- The net effect of order submissions, cancellations, and executions.
- Latent liquidity and trading intent beyond executed volume.
- Imbalances that are more likely to move prices, rather than just high activity levels.