The Limit Order Book: Revealed

Limit Order:
- Bid/Ask
- # of shares
- Execution time indefinite
- Limit Price

Market Order:
- Bid/Ask
- # of shares
- Executed immediately
- Price indeterminate

Courtesy of Laszlo Gillemot
Figure 2

Limit Order Book with Random Order Flow

Average Autocorrelation over 1000 runs and unique autocorrelation for 1 run.

Sum of the Autocorrelation, measures maximum profits.
How the Negative Autocorrelation Happens…
Franky, Where’s the Action?

Exponential Moving Average:

\[
\text{Signal} = \frac{\text{past returns} \ (t-1) - (t-2)}{\text{Tau}} + (1 - \frac{1}{\text{Tau}}) \times \text{past signal}
\]
Profits over Tau: NO!

Mean Profits for 50 runs over Tau values
Figure 6

Spread Trigger Profits: No!
Signal Trigger Profits: Occasionally!

![Graph showing average profits over a range of signal triggers and tau values.](image)
Appendix 1: Model Parameters

$\alpha = 1.0 = \text{limit order addition rate} = \frac{\# \text{ of shares}}{\alpha T}$

$p_{\text{Bin}} = 1.0 = \text{width (in prices along the book) of limit order additions with uniform, Poisson distribution}$

$\# \text{ of shares} = \alpha * P * \alpha T$

$\beta = 0.1 = \text{market order addition rate} = \frac{\# \text{ of shares}}{\beta T}$

$\gamma = 0.001 = \text{limit order expiration rate} = \frac{\# \text{ orders}}{\gamma T}$

$\delta = 1.0 = \text{typical order size, distributed with 1 standard deviation about 1}$

$\epsilon = 2 * \alpha * P / \delta = 0.2 = \text{non-dimensionalized parameter}$