Optimality Conditions for Intraday Equity Trades
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**Abstract**

Our research endeavors to create a mathematical model to determine the optimal time to enter and subsequently exit an equity position within a singular trading day. Building on the principles of mean reversion and momentum trading we present a model that consistently outperforms the benchmark over a 10 year trading period. Using the S&P 100 stocks from 2006-2016 as a sample size we show that our model delivers an average return of ~5 basis points per trade under ideal trading conditions defined by no slippage and constant transaction costs. Additionally, our model maintains a relatively low standard deviation of returns under calm and highly volatile markets.

**Method**

- Back test universe includes all S&P 100 stocks from 2006-2016
- Algorithm enters a trade when it detects a sharp downward movement—anticipating a reversion
- Once in a position, algorithm looks to meet upper or lower thresholds to sell security, 35bp and -40bp respectively.
- If price goes above upper threshold and algorithm detects increased momentum then algorithm will hold position until such time that the momentum has dissipated.
- Transaction costs are a constant $0.07/share round trip
- Algorithm assumes no slippage

**Data**

<table>
<thead>
<tr>
<th>Win Rate</th>
<th>32.78% Average Win: 112.30 bp</th>
</tr>
</thead>
<tbody>
<tr>
<td>Loss Rate</td>
<td>67.22% Average Loss: 47.70 bp</td>
</tr>
<tr>
<td>Expected Return/Trade</td>
<td>4.75 bp</td>
</tr>
</tbody>
</table>

**Impact**

- This research has the potential to build wealth for investors and solves the problem of volatility and uncertainty in stock market returns
- This research also presents the potential for a new investment product that offers risk uncorrelated to the market while delivering consistent returns

**Conclusions**

- We conclude that our algorithm presents a promising model for delivering consistent returns in the stock market, however there are further lines of inquiry to explore before trading in real time.

**Further Lines of Inquiry**

- Slippage presents a real risk to our expected returns and we need to build a model to account for this
- Execution time presents a risk to the algorithm as the price of a stock may change between the time the machine decides to trade and when the trade is executed with a broker

**References**

- Figure 1: Website: Trading Walk. Article, “How To Read Candlestick Charts Like A Pro”