Day Trading with Opening Range Breakout Strategies

Christian Lundström, M.Sc

www.ChristianLundstrom.com
Written for the Canadian Society of Technical Analysts

2013-07-02 Umeå, Sweden
Christian Lundström, M.Sc

Currently:
• Independent Trader
• PhD Candidate at the Department of Economics, Umeå University Sweden
• Independent Consultant in Absolute Return Strategies, Folksam Bank

Previously:
• Chief Investment Officer, Fund Manager for IIG AG, AB


**Earlier Work**
• The ORB strategy is based on the premise that if the price moves a certain percentage from the opening price level, the odds favor a continuation of that move until the closing price of that day. The ORB strategy suggests that long (short) positions are established at some predetermined price threshold a certain percentage above (below) the opening price, respectively. Crabel (1990).

• Profitability of the ORB strategy imply that the asset price must follow so-called intraday momentum at the price threshold levels, i.e., the tendency for rising asset prices to rise further and falling prices to keep falling, Holmberg et. al. (2013).
The Contraction-Expansion (C-E) principle:

• The principle is based on the observation that daily price movements seem to alternate between regimes of contraction and expansion, or, periods of modest and large price movements, respectively.
• In particular, the prices are characterized by intraday momentum during expansion days, whereas during contraction days, prices move randomly.
• As most days are contraction days an ORB strategy may be viewed as a strategy of identifying and profiting from days of price expansion and avoiding contraction days.
Figure 1. An ORB strategy trader initiates a long position when the intraday price reaches $\psi_t^u$ and then closes the position at $P_t^c$ with a profit.

\begin{figure}
\centering
\includegraphics[width=0.5\textwidth]{figure1.png}
\caption{ORB strategy diagram}
\end{figure}
\[ \psi^u_t = P_t + \rho \text{ and } \psi^l_t = P_t - \rho \]

\[ \rho = a + b\sigma \]

- Where \( P_t \) is the opening price at day \( t \), and \( a \) and \( b \) are positive constants. \( \sigma \) is the standard deviation of open-to-close returns.
\[ \rho = \sigma \]

Empirical illustration from Lundström (2013)
Data:

Table 1: Descriptive statistics for the price returns series

<table>
<thead>
<tr>
<th>Asset</th>
<th>Obs.</th>
<th>Mean</th>
<th>Std.Dev</th>
<th>Min</th>
<th>Max</th>
<th>Skewness</th>
<th>Kurtosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crude Oil</td>
<td>4845</td>
<td>0.0002</td>
<td>0.0077</td>
<td>-0.0606</td>
<td>0.0902</td>
<td>0.22</td>
<td>9.67</td>
</tr>
<tr>
<td>S&amp;P500</td>
<td>5018</td>
<td>0.0001</td>
<td>0.0093</td>
<td>-0.0912</td>
<td>0.0808</td>
<td>-0.06</td>
<td>11.73</td>
</tr>
</tbody>
</table>

Table 2: Descriptive statistics for the ORB strategy returns series for \( \rho=0.5 \) percentages

<table>
<thead>
<tr>
<th>Asset</th>
<th>Obs.</th>
<th>Mean</th>
<th>Std.Dev</th>
<th>Min</th>
<th>Max</th>
<th>Skewness</th>
<th>Kurtosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crude Oil</td>
<td>2827</td>
<td>0.0013</td>
<td>0.0072</td>
<td>-0.0100</td>
<td>0.0814</td>
<td>1.92</td>
<td>10.68</td>
</tr>
<tr>
<td>S&amp;P500</td>
<td>3314</td>
<td>0.0004</td>
<td>0.0081</td>
<td>-0.0100</td>
<td>0.0777</td>
<td>1.61</td>
<td>7.44</td>
</tr>
</tbody>
</table>

Larger average return (Mean), Smaller average risk (Std.Dev)

Illustration
Table 3: Empirical results of the long-run ORB profitability test. The $\rho$ is the per cent distance added and subtracted to the opening price. $T$ is the number of trades. $freq$ gives the proportion of trades that result in positive returns, while $A$ gives the average returns. The $p$-values are calculated based on the HAC standard errors.

<table>
<thead>
<tr>
<th>Asset</th>
<th>$\rho$ (%)</th>
<th>$T$</th>
<th>freq.</th>
<th>$A$</th>
<th>$p$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crude Oil</td>
<td>0.5</td>
<td>2827</td>
<td>0.5670</td>
<td>0.0013</td>
<td>0.0000</td>
</tr>
<tr>
<td></td>
<td>1.0</td>
<td>1044</td>
<td>0.5814</td>
<td>0.0020</td>
<td>0.0000</td>
</tr>
<tr>
<td></td>
<td>1.5</td>
<td>423</td>
<td>0.6099</td>
<td>0.0027</td>
<td>0.0000</td>
</tr>
<tr>
<td></td>
<td>2.0</td>
<td>189</td>
<td>0.6667</td>
<td>0.0036</td>
<td>0.0001</td>
</tr>
<tr>
<td>S&amp;P500</td>
<td>0.5</td>
<td>3314</td>
<td>0.4897</td>
<td>0.0004</td>
<td>0.0057</td>
</tr>
<tr>
<td></td>
<td>1.0</td>
<td>1572</td>
<td>0.5299</td>
<td>0.0006</td>
<td>0.0267</td>
</tr>
<tr>
<td></td>
<td>1.5</td>
<td>749</td>
<td>0.5220</td>
<td>0.0006</td>
<td>0.1755</td>
</tr>
<tr>
<td></td>
<td>2.0</td>
<td>368</td>
<td>0.5190</td>
<td>0.0006</td>
<td>0.4937</td>
</tr>
</tbody>
</table>

We find significant positive long-run profitability for some, or all, thresholds depending on the asset.
• Left: The strategy performance (in log prices starting with 100 USD) for crude oil futures from January 2, 1991 to January 26, 2011. No costs or slippage.
• Right: The strategy performance (in log prices starting with 100 USD) for S&P 500 futures from January 2, 1991 to November 29, 2010. No costs or slippage.

Illustration 13
• Day trading with opening range breakout strategies can generate value if the cost is small enough (Crabel, 1990; Holmberg et al, 2013; Lundström, 2013)

• Lundström (2013) shows that the ORB profitability is linked to intraday volatility and there could be as much as 2% differences in daily returns during high and low volatility states. Consequently, the ORB strategy should always be used in combination with volatility filters.

• Although not explicitly shown here, ORB returns are uncorrelated with other strategies such as long only as well as trend following strategies, CTA or Managed Futures.
• Thank you for listening!