OVERNIGHT REVERSAL SYSTEM

An overnight trading strategy to find reversals in liquid stocks, with a discretionary element.
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INTRODUCTION

There is a relative wealth of research into the effect of overnight returns in the stock market, both on the Social Sciences Research Network and on the trading strategy resource site Quantpedia.

One strategy suggests that traders should buy the S&P 500 at the close every evening and sell the trade on the next open, such is the significance of the overnight effect on stocks. Upon further analysis, however, it seems that this particular strategy becomes unprofitable once transaction costs are taken into account.

Recent Research

One paper that caught my eye was Large Price Declines, News, Liquidity, and Trading Strategies: An Intraday Analysis, from Fehle and Volodymyr.¹

The paper looks at reversals and overnight returns in the stock market, and ultimately suggests that large one-day losses often lead to significant reversals overnight.

The authors found that returns from the strategy increase with capitalisation and that returns are highest when there is no significant news story to accompany the loss. They found that the highest gains came from opening the trade on the close and exiting the trade at the next day’s open.

Theory

Investors are known to overreact to unexpected events and price moves. This overreaction may lead to mis-pricing which can then be taken advantage of by initiating a trade in the opposite direction.

Fehle and Volodymyr found that returns increased with the magnitude of event day loss, consistent with the overreaction hypothesis. And they found that reversals were higher for stocks without accompanying news releases, consistent with previous behavioural models.

Methodology

Fehle and Volodymyr obtained stock data from CRSP and intraday stock quotes from New York Trade and Quote (TAQ). They used options data from the CBOE and created a news variable using news samples from CBS.MarketWatch.com during the time period.

The authors then looked for instances of price reversal for stocks posting intraday losses of 10% or more. Their database consisted of 4,715 unique tickers over 492 trading days and a minimum price filter of $5 was used to eliminate illiquid stocks.

Hypothetical buy trades were placed in the last 15 minutes of the trading session and the trades were closed at five minute increments the following day, from 9:35 am to 4:00 pm, whenever the stock had lost more than 10% from the open.

The authors found that returns were strongest during the first five minutes of the trading day and gains tailed off towards the end of the session.

Importantly, Fehle and Volodymyr were able to directly incorporate transactions costs by basing returns on the average of bid and ask quotes at the moment of execution.

Results

Fehle and Volodymyr found that event stocks (those experiencing intraday losses of 10% or more) saw reversals commensurate with the magnitude of the loss. In other words, the larger the one day loss, the larger was the overnight reversal.

Returns were greatest for stocks that had tradable options markets and no accompanying news story. Returns increased with market capitalisation and trading volume. As well, the best time to exit the trade was on the next day’s open.

Key Findings:

- Option stocks tended to have higher reversals, possibly indicating that non-option (mostly small capitalization) stocks take longer to correct excessive moves
- Average returns for stocks in the top volume quartile exceeded those for stocks in the bottom volume quartile
- A trader focusing only on stocks with capitalization and event day trading volume

in the top quartiles and with relative event day losses in excess of 30% or 35% achieved overnight portfolio returns of 1.10% and 1.73%, respectively.

- 1 dollar invested at the beginning of the sample period with the gross proceeds continually reinvested into new event portfolios grew to $2.38 for the case of the strategy examined above, yielding an annual return of 54.29%.

Limitations
The authors of this paper do an excellent job of incorporating transaction costs. One limitation is that basing the strategy around news releases may not hold true anymore. Financial news coverage has grown substantially since 2000 so it’s now much more unlikely to find an event day loss without any accompanying news story. The biggest limitation is that the paper is confined to only one trading period – that of 2000 and 2001 – so it’s unclear whether the strategy holds up in more recent periods.

I therefore loaded up Amibroker and my historical stock database and attempted to test the strategy on more recent market data.

AMIBROKER ANALYSIS
Without access to intraday stock data or the same sample of news stories, it is not possible to replicate the overnight stock trading system completely. However, it is possible to test the basic premise of the strategy.

I therefore programmed my trading software (Amibroker) with the following system rules:

**Test One Rules:**
- When a stock loses more than 10%–35% intraday, buy on the close.
- Close the position on the next day's open.

**Test One Settings:**
- Stock is in the S&P 1500 universe
- Volume is greater than 1,000,000
- Open price greater than $5
- Position size set at 25%
- Starting capital = $100,000
- Commissions = $0.01 per share

**Test One Results:**
As you can see from the following table, our results are not particularly consistent with the paper discussed. This is to be expected, since our rules are not exactly the same.

Results from buying on the close after a large intraday loss and closing the trade on the next day open:

<table>
<thead>
<tr>
<th>Intraday Loss</th>
<th>CAR(%)</th>
<th>MDD($)</th>
<th>CAR/MDD</th>
<th>No. of Trades</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; 10%</td>
<td>9.35</td>
<td>47.39</td>
<td>0.2</td>
<td>454</td>
</tr>
<tr>
<td>&gt; 20%</td>
<td>74.42</td>
<td>13.11</td>
<td>5.68</td>
<td>139</td>
</tr>
<tr>
<td>&gt; 30%</td>
<td>35.87</td>
<td>-8.46</td>
<td>4.23</td>
<td>31</td>
</tr>
<tr>
<td>&gt; 35%</td>
<td>23.77</td>
<td>5.26</td>
<td>4.52</td>
<td>15</td>
</tr>
</tbody>
</table>

Still, it’s interesting to see that we achieved fairly similar results during the data period 2000-2002 and saw annualised returns over 50%, like the paper did. However, we did not see returns increase with the magnitude of the event day loss. Instead, we saw the number of trades decline substantially.

**Test Two**
Keeping everything the same, we can now move the test forward and see how this strategy performed over more recent data periods.

**Test Two Results**
As you can see from the table, the excellent returns experienced in 2000-2002 were not repeated in subsequent years between 2002-2015.

<table>
<thead>
<tr>
<th>Intraday Loss</th>
<th>CAR(%)</th>
<th>MDD($)</th>
<th>CAR/MDD</th>
<th>No. of Trades</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; 10%</td>
<td>3.84</td>
<td>51.8</td>
<td>0.07</td>
<td>1629</td>
</tr>
<tr>
<td>&gt; 20%</td>
<td>4.1</td>
<td>54.97</td>
<td>0.07</td>
<td>290</td>
</tr>
<tr>
<td>&gt; 30%</td>
<td>-0.33</td>
<td>53.46</td>
<td>-0.01</td>
<td>58</td>
</tr>
<tr>
<td>&gt; 35%</td>
<td>-1.42</td>
<td>55.73</td>
<td>-0.03</td>
<td>33</td>
</tr>
</tbody>
</table>

The best performing run gave us a CAR/MDD of just 0.07. The logical conclusion is that the strategy no longer performs as it once did.

It’s highly likely that the edge from this system has been arbitraged out of the market. In 2000-2001, the system made a lot of money by entering into overnight reversals on stocks that dropped over 20% intraday. The frequency of these large intraday drops has decreased in recent years as the markets have become more efficient. These profitable situations are less common and this was directly seen in the market between the sample period of 2000-2010.

Furthermore, the strategy saw some big losers during the financial crisis. For
example, the strategy bought Bear Stearns on 3/14/2008 after a big intraday loss. The stock opened the next day lower by 90%, all of those losses coming overnight.

This shows the merit of the rule regarding the impact of news stories. As the paper suggests, stock returns are greater when there is no accompanying news story for the loss. And in this situation, a responsible trader might be able to avoid entering a trade in a company that had a very high risk of bankruptcy.

As a result, this strategy might be another one to benefit from the human touch.

Test Three
Although the system results have clearly deteriorated, there might still be potential for this strategy, if we can diversify our risk, modify the rules and attempt to avoid the worst losing trades.

I therefore decided to do some more investigation into the system and see if a worthwhile, profitable strategy could yet be developed.

In test three, I make some changes to the original system in order to see if the strategy might still be useful.

The first thing was to increase the maximum size of the portfolio from 1 position to 5 positions, and then change the position sizing to a fixed amount of $20000 per trade (equivalent to 20% of the starting capital).

By doing this, we can spread our risk across different trades and this means our strategy will not be too damaged by one bad trade.

The next thing was to reduce the volume criteria to 100,000 shares from 1,000,000. As markets are more efficient now, it makes sense to relax our criteria somewhat.

Running this system on the S&P 1500 universe between 1/1/2000 and 1/1/2010 produced the following results:

<table>
<thead>
<tr>
<th>Time Period 2000-2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intraday Loss</td>
</tr>
<tr>
<td>&gt;10%</td>
</tr>
<tr>
<td>&gt;20%</td>
</tr>
<tr>
<td>&gt;30%</td>
</tr>
<tr>
<td>&gt;35%</td>
</tr>
</tbody>
</table>

The best performing simulation came from using an event-day loss of over 20%, producing a compound annual return of 14.97% and CAR/MDD of 1.33.

I therefore moved the test forward and ran the simulation on the out-of-sample period from 1/1/2010-1/1/2015.

Test Three OOS
As can be seen from the results, the strategy produced an annualised return of 5.30% in the OOS period with a maximum drawdown of -2.69%.

<table>
<thead>
<tr>
<th>Time Period 2016-2015 (OOS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intraday Loss</td>
</tr>
<tr>
<td>&gt;20%</td>
</tr>
</tbody>
</table>

Looking at these results, the annual return may not be huge but we can see that there is potential. The CAR/MDD value is high at 1.97 and the risk adjusted return figure is high at 317.60%. The Sharpe ratio is also excellent at 4.54.
The system only traded 98 times in the five years, so this is not a strategy to stake your career on, however, it could be another good system to add to the toolbox – to use when the time calls.

ADDING SOME DISCRETION

It was noted in the academic paper that the rules work best when there is no accompanying news story to explain the intraday loss.

While I believe that such an outcome is unlikely nowadays (due to the sheer coverage of financial news), perusal of the trade list indicates that some investor discretion could certainly help performance.

For example, we have already seen that our biggest loss in our prior test was a trade that went sour in Bear Stearns Inc, the ill-fated investment bank which succumbed to the 2008 financial crisis.

And closer investigation shows further examples. For instance, another losing trade came in YRC Worldwide (YRCW) which fell substantially overnight on the 25th February 2011.

By searching for the company name and the trade date on Google News we can see that the company was flirting with bankruptcy at the time.

Again, this is probably not the type of business an investor would like to buy. By reading between the lines it might be better to avoid this type of trade.

Google News clipping from the time:

YRC Worldwide Inc. (NASDAQ: YRCW) announced a deal that saves the company from bankruptcy, but the deal also dilutes holders yet again. The troubled trucking giant reached a deal with creditors and with union workers. This is a comprehensive restructuring but officials did not entirely disclose terms other than that this will record the prior $470 million debt for equity swap. Some debt is being converted into equity and the company will get a new flow of liquidity and capital. The company noted that this will allow it “to achieve its growth plans and restore the company as a viable enterprise.”

On the other side of the spectrum, analysing the biggest winners reveals something equally as interesting.

Searching through the news sources, many of the big winners, saw shock events, just like the biggest losers. However, it seems that in many cases, these shock events could be classed as relatively transitory.

For instance, one of the best winning trades came for Community Health Systems (CVH) on 4/11/2011. In this case, the shock development was a lawsuit filed against the company relating to an allegation of Medicare fraud.

However, closer examination shows that the company doing the alleging had ulterior motives for filing the suit – to get out of a hostile takeover bid. As well, the management at CVH hotly contested the claims.
Google News clipping from the time:

**Health Care**

**Tenet Healthcare suit alleges Medicare fraud by bidder Community Health Systems**

By JASON ROBERSON

Published: 11 April 2011 02:05 PM
Updated: 11 April 2011 09:31 PM

Dallas-based Tenet Healthcare Corp. filed a Medicare fraud lawsuit Monday as part of an effort to fight off a hostile takeover bid.

Although the news was very damaging to CVH, the bottom line is that this is probably not the type of news that would have put the company’s future in jeopardy. And taking this trade on might make more sense for traders looking for a reversal.

Overall, this suggests that some discretion can help improve our strategy, just like the academic paper alluded to.

**SYSTEM IN PLAIN LANGUAGE**

To implement the overnight strategy then is relatively simple.

An investor must simply wait for a stock to experience an intraday loss of over 20% (open to close). That stock should be in the S&P 1500, have an open price over $5 and have a daily volume in excess of 100,000 shares. (Investors can certainly experiment with wider stock universes too and may well have success there).

The investor then buys the stock on the close and exits the trade on the very next open, in order to capture the overnight rebound.

Recommended risk is 20% of starting capital per trade (fixed amount) with a maximum portfolio of 8 stocks.

**Discretionary Element**

In order to improve returns, investors should do some due diligence in the last half hour of trading and then abide by the following discretionary rules:

- If there is barely any news to explain the intraday loss, the trader should follow the system and buy on the close.
- If the accompanying news event is likely to be a temporary setback for the company, the trader should follow the system and buy on the close.
- If the accompanying news event has the potential to jeopardize the future of the company, the trader should ignore the signal and do nothing.

**Limitations & Improvements**

One limitation of the test is that, unlike the academic paper, I had no access to intraday quotes. I was therefore unable to directly incorporate transactions costs by basing returns on the average of bid and ask quotes at the moment of execution, like the authors did. Instead, I used commissions of $0.01/share to simulate the cost of transaction.

In terms of improvements, investors can experiment with wider stock universes in order to find more reversals. They can also trial different discretionary techniques and experiment with varying levels of leverage.

**UPDATE 07.28.15**

Commissions of $0.01/share may be too optimistic for this strategy. Readers should consider testing more conservative estimates such as 0.2%, 0.5% or 1% per trade. A stock that is undergoing a 20% intraday move is likely to experience significant slippage so this needs to be accounted for where possible.

**CREDITS**


Amibroker

Norgate Premium Data

Quantpedia

Amibroker code is provided on the next page.
SetFormulaName("Overnight Reversal");
Size1 = 5; //Optimize("size1",18,18,34,2);
SetOption("InitialEquity", 100000);
SetOption("MinShares", 1);
SetOption("MarginRequirement", 100);
SetOption("UsePrevBarEquityForPosSizing", false);
SetTradeDelays(0, 0, 0, 0);
SetOption("MaxOpenPositions", size1);
SetOption("AllowSameBarExit", false);
NumberPositions = size1;
SetOption("MaxOpenPositions", numberPositions);
SetOption("MaxOpenPositions", numberPositions);
//TimeFrameSet(inDaily);
PositionSize = 20000;
PositionScore = RSI(14);

// Amendment for delisted securities
Delisting = GetFnData("DelistingDate");
ThisIsLastBar = BarIndex() == LastValue(BarIndex());
ExitLastBar = datetime() >= GetFnData("DelistingDate");
Cond = IIf(IsNull(delisting), 1, DateTime() < delisting);

// Liquidity
Liquid = OpenInt>5 AND V>100000;// AND fix;

// Trading System
reverse = o*0.80;
Buy = C<reversal AND liquid AND cond;
Sell = O or thisislastbar OR exitlastbar;
BuyPrice = C;
SellPrice = O;
Buy = ExRem(Buy, Sell);
Sell = ExRem(Sell, Buy);