Understanding Opening Gaps (Part 2)

Introduction

In Part 1 of the *Understanding Opening Gaps* study we tried to determine whether gap size, short-term market condition and long-term market condition were useful predictors of intraday directional bias following a gap up or gap down. We saw that the size of the morning gap and varying bullish or bearish market conditions directly affect the likelihood of opening gaps ending positively or negatively for the day.

In this study we will look at whether the conditional filters seen in Part 1 could be used to construct profitable "gap fading" strategies. These types of systems are used extensively by gap traders seeking to capitalize on the short-term mean-reverting traits often observed in stock market time series.

With gap trading, positions are taken at the open and then closed either at gap fill (yesterday's close), at the end of the day's trading session or at a predetermined stop level. In this paper we will focus specifically on down gaps, so on opening prices that print below the previous day's closing price.

Analysis

The instrument used in this study is the ES (E-mini S&P500 futures contract), from Jan 1st 2000 to Dec 31st 2014. Having determined in Part 1 of *Understanding Opening Gaps* that very large gaps have a tendency toward continuation in the direction of the opening gap, we will exclude gaps larger than 0.75% from our study. We will also exclude very small gaps (<0.25%) since the small profit potential of these trades would not warrant the issues of slippage and commissions associated with real life trading. System rules:

- Instrument: ES (S&P500 ETF), from Jan 1st 2000 to Dec 31st 2014 (15 years)
- Position size: 10 contracts
- Down gaps only
- Minimum gap size: 0.25%
- Maximum gap size: 0.75%
- Enter long at the open (based on specific conditions)
- Exit at gap fill or at end of day
- No stop
- No allowance for commissions or slippage

Seasonality - Day of Week

We first look at whether specific weekdays impact the profitability of our gap-fading system.

Table 1

Down Gap (>=0.25% & <=0.75%); Go Long at the Open; Exit on Gap Fill or EOD						
Day of week	Total Trades	Winners	Losers	Win Rate (%)	Avg Win / Avg Loss Ratio	PF
Any	653	456	196	69.83	0.46	1.08
Monday	116	70	45	60.34	0.39	0.61
Tuesday	141	97	44	68.79	0.52	1.14
Wednesday	157	114	43	72.61	0.50	1.32
Thursday	122	98	24	80.33	0.47	1.91
Friday	120	79	41	65.83	0.44	0.84

As we can see in the first row of Table 1 (in yellow), systematically fading all down gaps without additional filters would have barely been a breakeven strategy from 2000-2014. While the system's 70% win rate is high, the size of the average losing trade is more than twice the size of the average winning trade, yielding a profit factor of only 1.08. However, we also notice that some days of the week appear to favour gap fill more than others. Tuesdays,

Wednesday and Thursdays in particular - with their higher than average win rates and profit factors (green cells) - would appear to be more susceptible to gap fill. Results for Mondays and Fridays, however, are considerably more bearish, suggesting that these two days are more inclined to see more follow-through after a down gap. This is in line with the trading "personalities" specific to Mondays and Fridays, often observed in other studies.

Mean Reversion

Gap fading strategies all rely on the concept of mean reversion. We will now look at how the size of the displacement of price from its mean (as measured by a large fall in the previous day's prices) impacts the likelihood of gap fill.

Table 2

Down Gap (>=0.25% & <=0.75%); Go Long at the Open; Exit on Gap Fill or EOD						
Condition	Total Trades	Winners	Losers	Win Rate (%)	Avg Win / Avg Loss Ratio	PF
After >0.5% drop	161	118	42	73.29	0.37	1.03
After >1.0% drop	92	73	19	79.35	0.32	1.24
After >1.5% drop	47	40	7	85.11	0.25	1.41
After >2.0% drop	31	28	3	90.32	0.22	2.10
After >2.5% drop	20	19	1	95.00	0.43	8.23
After >3.0% drop	6	6	0	100.00	100.00	100.00

As we can see in Table 2, down gaps that follow small to medium size daily drops provide low profit expectancy. However, when the previous day's drop is large (>1.5%), prices have a greater tendency to bounce and gaps to fill.

Similar results are obtained when measuring displacement from the mean using different criteria. In Table 3 below we see that down gaps that follow a greater number of lower closes have an increasingly larger chance to fill.

Table 3

Down Gap (>=0.25% & <=0.75%); Go Long at the Open; Exit on Gap Fill or EOD						
Condition	Total Trades	Winners	Losers	Win Rate (%)	Avg Win / Avg Loss Ratio	PF
After 1 lower close	275	192	83	69.82	0.40	0.94
After 2 lower closes	115	90	25	78.26	0.38	1.36
After 3 lower closes	39	32	7	82.05	0.32	1.46
After 4 lower closes	14	12	2	85.71	0.34	2.03
After 5 lower closes	6	5	1	83.33	0.52	2.58

Short-Term & Long-Term Market Conditions

In Part 1 of *Understanding Opening Gaps* we saw that both short-term (ST) and long-term (LT) market condition affect intra-day directional bias. Table 4 below shows the results of applying a few ST and LT conditional filters to our gap-fading system:

Table 4

Down Gap (>=0.25% & <=0.75%); Go Long at the Open; Exit on Gap Fill or EOD						
Condition	Total Trades	Winners	Losers	Win Rate (%)	Avg Win / Avg Loss Ratio	PF
After 2 lower closes	115	90	25	78.26	0.38	1.36
After 2 lower closes C<10 DMA	85	68	17	80.00	0.39	1.56
After 2 lower closes C>200 DMA	62	49	13	79.03	0.48	1.81
After 2 lower closes C<10 DMA & C>200 DMA	39	32	7	82.05	0.53	2.40

The first row of the table shows the results of fading down gaps after 2 lower closes. As we can see, adding a ST oversold conditional filter (price *below* the 10 day MA) increases trade expectancy, as does adding a LT bullish

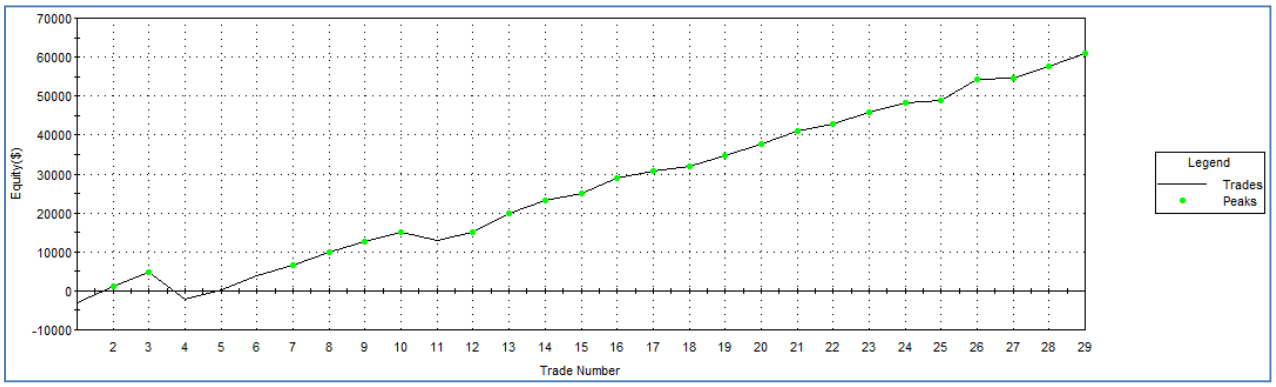
conditional filter (price *above* the 200 day MA). This indicates that down gaps are more likely to fill when the market is short-term oversold and/or is experiencing a long-term bull run. The best results are seen in the last row of the table, when both conditions are in place.

Example System: Gap Down After one Down Day Followed by an Unfilled Down Gap

Profitable gap fading systems can be created using various combinations of seasonality, mean-reversion and market condition filters. For example, applying a simple filter such as "after an unfilled down gap that followed a down day" to our existing rules and data set yields the following results:

Table 5

Down Gap (>=0.25% & <=0.75%); Go Long at the Open; Exit on Gap Fill or EOD						
Condition	Total Trades	Winners	Losers	Win Rate (%)	Avg Win / Avg Loss Ratio	PF
After Down Day and Unfilled Down Gap	29	26	3	89.66	0.69	5.98



Summary

Our findings:

- Down gaps appear to be more prone to filling on specific days of the week. Tuesdays, Wednesdays and Thursdays offer favourable gap-filling probabilities under certain conditions, while Mondays and Fridays could arguably be avoided by the down-gap fading trader. See Table 1.
- The size of the displacement of prices relative to mean impacts their tendency to bounce back towards it. The larger the displacement, the higher the likely profit expectancy of the down-gap fading system. See Tables 2 and 3.
- During long-term bullish periods (above the 200 day MA), the market tends to respond more favourably to bad news (down gaps) than during long-term bearish periods. Furthermore, when the market is short-term oversold (below the 10 day MA), down gaps are more likely to fill. See Table 4.
- Profitable gap-fading strategies can be constructed using relatively simple entry criteria, as shown in Table 5. A complete gap-trading system can be developed by exploiting a portfolio of several gap-fading strategies, possibly applied to a number of different financial instruments.