



Understanding Opening Gaps (Part 1)

Introduction

An opening gap is the difference between a trading day's closing price and the opening price of the next day's regular trading session. These gaps, of varying sizes, occur almost every day and are the result of fresh economic news or of new market announcements made between two trading sessions. They can also materialize purely for "technical" reasons, such as a rebound from a prior day's intense selling or a pullback after a strong daily rally.

Gaps range from the very small to the very large and occur in all types of market conditions: short-term overbought/oversold, bear markets and bull markets. Some gaps have a high statistical probability of closing before the end of the day's trading session and there exists a subset of traders who make a living exploiting these edges (i.e. "fading" gaps). Conversely, some opening setups seem to encourage trading in the direction of the gap, motivating traders to "follow" the gap.

In this study we will look at opening gaps under varying market conditions to determine whether strategies that fade or follow the gap are likely to offer any solid exploitable edge. We will also look at whether the size of gaps influences in any way the likely direction of the day's trading session.

Analysis

For this study we will use a 30 minute chart with pre-market data of the SPY (S&P500 ETF). The pre-market data will allow us to determine the exact gap size at 09:30 and take a long position at the open of the regular session. The data set we'll use is only from Jan 1st 2003 to Dec 31st 2014 because reliable pre-market data is simply not available prior to 2003. This is unfortunate as it reduces the sample size and hence the statistical relevance of our analysis. On the up-side, any findings will have the advantage of being more current and in line with existing market dynamics.

We will first look at the results of systematically entering the market depending on the direction of the opening gap, without any filters, using the following rules:

- Instrument: SPY (S&P500 ETF), from 2003 to 2014 (12 years);
- Position size: \$100,000;
- Enter long at the open;
- Exit at the close;

Table 1

Go Long at the Open; Exit at the Close							
GAP (Today's open vs. Yesterday's Close)	Total Trades	Winners	Losers	Win Rate (%)	Avg Win / Avg Loss Ratio	PF	Net Profit (\$)
Up	1499	807	688	53.84	0.94	1.10	49,033
Either	2748	1473	1266	53.60	0.90	1.05	46,272
Down	1238	661	572	53.39	0.86	1.00	-1,740

As we can see in Table 1, up gaps appear to slightly improve the average trade's outcome. That is, buying into up gaps and holding until the end of the day has historically been more profitable than buying into down gaps. Note, however, that the difference is only marginal: win rates are almost identical in both cases, and only a slightly higher average win/loss ratio for up gaps make the resulting profit factor more attractive (1.10) than for down gaps (1.00).

These results should therefore be considered somewhat inconclusive, and suggest that the existence of an up or down gap alone cannot and should not be used as an indicator of short-term market strength or weakness.

We will now look at whether *long-term market condition* affects the above statistics. That is, whether up or down gaps in bearish or bullish markets are somehow more "predictive" of short-term market direction. In this analysis we



will define a bullish market as being in place when yesterday's closing price was above the 200 day moving average and a bearish market when yesterday's closing price was below the 200 day moving average.

Table 2

Go Long at the Open; Exit at the Close (Long-Term Market Condition Filter)								
Market Condition	GAP	Total Trades	Winners	Losers	Win Rate (%)	Avg Win / Avg Loss Ratio	PF	Net Profit (\$)
Bullish LT	UP	1087	588	495	54.09	0.87	1.04	10,107
Bullish LT	DOWN	904	497	402	54.98	0.85	1.05	11,703
Bearish LT	UP	412	219	193	53.16	1.04	1.18	38,926
Bearish LT	DOWN	334	164	170	49.10	0.97	0.94	-13,442

The data for the bull-market condition, shown in the top 2 rows of Table 2, is far from telling. Win rates for up or down gaps are almost identical, as are win/loss ratios and profit factor figures. So the occurrence of an up and down gap during a bull market offers no statistical clue as to the likely direction of the day's intra-day session.

The data for up/down gaps during bear markets, however, is a little more interesting. We see that up gaps during bear markets offered statistically significant, albeit marginal, higher trade expectancy than up gaps during bull markets. Similarly, down gaps during bear markets showed a higher *negative* trade expectancy than down gaps during bull markets. A likely reason for this is that up gaps during typically volatile bear markets are greeted with relief and optimism, while down gaps are interpreted as further confirmation of the overall downwards trend. Traders will therefore more inclined to follow the gap during bear markets than during bull markets.

We will now look at gaps under different *short-term* (ST) market conditions. We will define a bullish ST market as being in place when the prior day's closing price was above the 10 day moving average, and a bearish ST market when the prior day's closing price was below the 10 day moving average.

Table 3

Go Long at the Open; Exit at the Close (Short-Term Market Condition Filter)								
Market Condition	GAP	Total Trades	Winners	Losers	Win Rate (%)	Avg Win / Avg Loss Ratio	PF	Net Profit (\$)
Bullish ST	UP	841	438	399	52.08	0.82	0.90	-24,116
Bullish ST	DOWN	775	432	339	55.74	0.85	1.08	17,567
Bearish ST	UP	658	369	289	56.08	1.03	1.32	73,150
Bearish ST	DOWN	463	229	233	49.46	0.93	0.91	-19,307

Table 3 shows the results of buying up/down gaps depending on ST-market condition. Notable is the fact that up gaps during bullish ST conditions appear to present a mildly negative trade expectancy. So following the gap in these instances would have been a losing long-term proposition. Down gaps during bullish ST conditions, however, appear to offer little indication as to where the day's session will close.

During bearish ST market conditions, buying up gaps would have offered a statistically significant positive trade expectancy (PF of 1.32). So in these conditions, following the up gap seems the way to go. However, down gaps here too display only a very small edge, in this case here a negative one.

We will now investigate whether the size of the gap in any impacts the following vs. fading edge. Below is a table showing the results of buying gaps of varying sizes:

Table 4

Go Long at the Open; Exit at the Close (Results by Gap size)							
GAP	GAP SIZE	Total Trades	Win Rate (%)	Avg Win / Avg Loss Ratio	PF	Net Profit (\$)	
UP	>= 1%	124	57.26	1.06	1.42	28,747	
UP	>= 0.75% and <1%	90	57.78	0.89	1.21	7,188	
UP	>= 0.5% and <0.75%	202	53.96	0.91	1.07	5,195	
UP	>= 0.25% and <0.5%	421	52.49	0.94	1.04	4,479	
UP	>0% and <0.25%	678	53.69	0.89	1.04	6,403	



All	All	2748	53.60	0.90	1.05	46,272
DOWN	>0% and <0.25%	579	54.06	0.92	1.09	12,840
DOWN	>= 0.25% and <0.5%	295	57.63	0.82	1.12	9,834
DOWN	>= 0.5% and <0.75%	141	56.03	0.93	1.21	10,649
DOWN	>= 0.75% and <1%	87	45.98	0.36	0.60	-19,094
DOWN	>= 1%	145	43.45	1.13	0.87	-15,885

As we can see, the occurrence of small and medium size gaps, both up or down, offer little or no insights into the likely direction of the day's intra-day session. Only when gaps become very large (>0.75% or >-0.75%) does a distinct edge begin to appear. Indeed, the very large up gaps, while only accounting for 14% of all up gaps, represent 73% of the gains shown in Table 1. Similarly, the very large down gaps, while accounting for only 19% of all down gaps, generated 20 times more losses than all down gaps combined.

So, when it comes to gaps, size *does* matter. Small and medium sized gaps offer little or no hint as to where the market will close relative to the opening price. Large gaps, however, have historically favoured buying into strength and selling into weakness. The most likely reason for this is that small and medium size gaps tend to be dismissed by the market as "technical" and hence inconsequential, and are often reabsorbed back towards the prior day's closing price by the forces of mean-reversion. Very large gaps, however, are usually created by significant world events or extremely positive/negative macroeconomic announcements. So large gaps are taken seriously, with up gaps often generating fierce daily rallies and down gaps dramatic daily swoon. So "following the gap" appears to be the right strategy in these cases.

Summary

Our findings can be summarized as follows:

- Up gaps of all sizes have a small tendency to generate further buying interest during the rest of the trading day. But the edge is marginal, so buying the market after all and any up gap would not be advisable. Down gaps, on the other hand, produce an almost perfectly neutral daily market bias. So systematically shorting all down gaps would not prove to be a winning long-term strategy either. See Table 1.
- During long-term bearish periods, the market tends to respond slightly more favourably to good news (up gaps) and negatively to bad news (down gaps) than during long-term bullish periods. This suggests that strategies that follow the gap are likely to be more successful in a bear market than in a bull market. See Table 2.
- During short-term bullish periods (market above the 10 day moving average) up gaps have a slight tendency to "fade" during the trading day - i.e. mean-revert downwards due to profit-taking. Conversely, up gaps during short-term bearish periods are greeted more enthusiastically and tend to attract further buying throughout the trading day. See Table 3.
- Small and medium sized gaps are often dismissed by the market as little more than noise. Larger gaps, however, are taken more seriously and generally see traders buy or sell in the direction of the gap.
- Gap faders - i.e. those speculating that the gap is likely to fill intraday - should consider focusing exclusively on small/medium sized gaps, and arguably only on up/down gaps that occur during short-term overbought conditions.
- Gap followers - i.e. traders who buy in the direction of the opening gap - should consider focusing only on large gaps. Moreover, their follow-the-gap systems are likely to perform best when gaps occur during *either* long-term oversold *or* short-term oversold periods.