

Analyzing Gaps for Profitable Trading Strategies

Gaps have attracted the attention of market technicians since the earliest days of stock charting. A gap up occurs when today's low is greater than yesterday's high (See Gap A in Figure 1). A gap down occurs when today's high is lower than yesterday's low (See Gap B in Figure 1.). A gap creates a hole in a daily price bar chart. This gap is called a "window" when using candlestick charts. A gap up is referred to as a "rising window" and is considered a bullish signal. A "falling window," which is a gap down, gives a bearish signal. (Nison, 2001)

It is easy to understand why early technicians noticed gaps; gaps are conspicuous on a stock chart. However, technicians did not just pay attention because they were easy to spot. Because gaps show that price has jumped, they may represent some significant change in what is happening with the stock and signal a trading opportunity. According to Edwards and Magee, the importance attached to gaps was unfortunate because

there soon accumulated a welter of 'rules' for their interpretation some of which have acquired an almost religious force and are cited by the superficial chart reader with little understanding as to why they work when they work (and, of course, as is always the case with any superstition, an utter disregard of those instances where they don't work).

Edwards and Magee, 1966, p 190

Given the persistence of some of these superstitions, such as "a gap must be closed," surprisingly little study has been undertaken to analyze the effectiveness of using gaps in trading. In this paper we provide a comprehensive study of gaps in an attempt to isolate gaps which present profitable trading strategies.

LITERATURE REVIEW

Breakaway gaps occur when price suddenly breaks through a formation boundary and signal the beginning of a trend. These are thought to be the most profitable gaps. In fact, David

Figure 1
Gaps, or Windows on a Bar Chart



Landry (2003) provides a method for mechanizing trading of breakaway gaps known as the “explosion gap pivot.” Runaway gaps, also known as measuring gaps, occur during a trend, often in the middle of a price run. These gaps are traded in the direction of the gap to profit from the directional trend. According to Bulkowski (2010), an upward runaway gap occurs on average 43% of the distance from the beginning of the trend to the eventual peak, and a runaway gap down occurs at 57% of the distance on average.

However, a third type of gap, the exhaustion gap, occurs at the end of a strong trend; because price may reverse immediately or remain in a congestion area for some time, trading these gaps should be avoided. In hindsight it is easy to recognize an exhaustion gap from the profitable breakaway and runaway gaps, but as they are occurring, the gaps can have similar characteristics. In his book *The Master Swing Trader*, Alan Farley (2000) extends Edwards and Magee’s discussion of gaps to include a “hole-in-the-wall” strategy. Farley gives extended examples of situations where an exhaustion gap occurs in the opposite direction from what would be expected to occur.

Few of the detailed studies of gaps have systematically considered gaps occurring in the stocks of publicly traded companies. Instead, most have dealt with index futures contracts or tracking stocks such as SPY. For example, Weintraub (2007) claims that the tendency for a gap to be closed is indirectly proportional to the size of the gap; he attempts to distinguish between common gaps and breakaway gaps by considering the magnitude of the gap in the mini index futures contracts. Bukey (2008) studies double gaps, defined as two gaps occurring within ten days of each other, in SPY. He finds that double gaps are unremarkable unless they are divided into two categories: filled and unfilled. If SPY gaps up twice within a 10-day period and the first gap was not filled, the market is more likely to fall the next day and then trade sideways. If

the first gap is filled, then the SPY drop is often delayed. Also, if the SPY double gaps down and the first gap was filled, then the market is more likely to rebound within four days.

DATA AND METHODOLOGY

To study more closely the gaps for individual stocks, we consider stocks included in the Russell 3000 between January 1, 2006 and December 31, 2010.¹ During this time period, 20,611 gap ups occurred and 17,435 gap downs occurred. With 1,259 trading days in the sample, this is an average of about 16.4 stocks gapping up and 13.8 stocks gapping down each trading day. Although some days, such as April 1, 2009, which had 375 gap up stocks and February 17, 2009, which had 409 gap down stocks, have a much higher observation of gaps, a typical day is characterized by at least a few gaps. Gap ups occurred on 1153, or 91.6%, of the trading days. Gap downs occurred on 1033, or 88%, of the days. A gap of one variety or the other occurred on 1164, or 92.5%, of the days.

The gapping stocks represented a wide range of companies. One-thousand-one-hundred-and-thirty-three of the stocks in our sample experienced at least one gap up, and 1,135 experienced at least one gap down.

Throughout this study, we use “Day 0” to represent the day a gap occurs. For example, consider a gap up. The day before the gap is Day -1 and the stock’s high on Day -1 is the beginning of the gap. On the next day (Day 0), the stock’s low exceeds the high on Day -1. We base our return calculations from the open at the next day (Day 1) to the close on Day 1 to calculate a 1-day return. To calculate longer returns, the return is calculated from the open at Day

¹ To be included in this sample, a stock had to have a trading volume of over 1 million shares on the gap day and the four prior trading days to ensure that decent liquidity existed.

1 to the close on the day of the return length; therefore, a 3-day return is calculated as buying at the open of Day 1 and selling at the close of Day 3.

RESULTS

Gap Ups

Table 1 shows the overall results for trades based on observing gap ups. On Day 1, the day following a gap up, a stock averages a price decline of 0.056%.² While following a trading strategy of going long a stock that gaps up one day after the gap is not profitable in our sample, this result must be considered given the overall market backdrop of this time period.

Table 1
Returns for Gap Up Stocks
Based on Day 0 Candle Color

	Day 0 Candle Color		
	Black	White	All
1 Day Return	-0.206	-0.025	-0.056
3 Day Return	-0.272	-0.082	-0.114
5 Day Return	-0.010	0.266	0.219
20 Day Return	-0.303	1.193	0.942
1 Day SPY Return	-0.028	-0.066	-0.060
3 Day SPY Return	-0.053	-0.078	-0.073
5 Day SPY Return	0.147	0.094	0.103
20 Day SPY Return	-0.203	0.336	0.246
1 Day Mkt Adj Ret*	-0.179	0.041	0.004
3 Day Mkt Adj Ret	-0.218	-0.004	-0.040
5 Day Mkt Adj Ret	-0.157	0.171	0.116
20 Day Mkt Adj Ret	-0.100	0.857	0.696

*Market Adjusted Return

Investing in SPY instead of the gap up stocks presented in Table 1 would have resulted in an average loss of 0.06% on these days. Thus, the stocks that gapped up performed much better

² Numbers in all tables throughout the paper are percentage returns. Thus “-0.056” in the table represents a 0.056% decline.

the day after the gap than did the average stock in the market. If the gapping stock is held for 5 or 20 days after the gap, on average, the return will be positive and higher than the market return. These results suggest that stocks that gap up do, on average, outperform the market over the next several weeks.

A closer look at the data, however, reveals that these gains come from a subset of the stocks—those that are characterized by a white candle on the gap day (such as Gap A in Figure 1). The results suggest that when a stock gaps up and closes higher than it opens, this upward price trend will continue for the next few trading days, leading to a profitable trading strategy. However, if the price gaps up, but the close is lower than the open, even though the gap remains unfilled, don't expect the upward price movement to continue. Stocks exhibiting these black candlesticks on the day the gap occurs tend to have negative returns, and underperform the market over the next several days.

Looking at the price movement on the day of the gap appears to help identify profitable trading opportunities. What if this analysis is extended to looking at the price movement the day before the gap occurs? Table 2 presents returns broken down by Day -1 candle color. This table shows that a black candle on Day -1 followed by a white candle on Day 0 is associated with above market returns.

Table 2
Returns for Gap Up Stocks
Based on Day -1 Candle Color

	Day -1 Candle Color					
	Black			White		
	Day 0 Candle Color			Day 0 Candle Color		
	Black	White	All	Black	White	All
1 Day Return	-0.029	0.144	0.113	-0.252	-0.063	-0.094
3 Day Return	0.060	0.249	0.215	-0.356	-0.156	-0.189
5 Day Return	0.172	0.287	0.266	-0.056	0.261	0.209
20 Day Return	0.048	0.828	0.686	-0.392	1.274	1.001
1 Day SPY Return	0.094	0.022	0.035	-0.059	-0.086	-0.081
3 Day SPY Return	0.115	-0.005	0.017	-0.096	-0.094	-0.094
5 Day SPY Return	0.034	0.019	0.022	0.176	0.111	0.122
20 Day SPY Return	-0.005	0.190	0.154	-0.253	0.369	0.267
1 Day Market Adjusted Return	-0.123	0.123	0.078	-0.193	0.023	-0.013
3 Day Market Adjusted Return	-0.055	0.254	0.198	-0.260	-0.062	-0.094
5 Day Market Adjusted Return	0.137	0.268	0.244	-0.232	0.150	0.087
20 Day Market Adjusted Return	0.053	0.638	0.531	-0.138	0.906	0.734

Is gap size important to the trader? A gap simply means that there is a void on the price chart at which no shares traded hands. This void could be very small (a penny) or it could be large (several dollars). Kirkpatrick and Dahlquist (2011) suggest that the size of a gap will be proportional to the strength of the subsequent price move for breakaway gaps. Hartle and Bowman (1990) suggest that relatively small gaps are not significant. In order to see if the size of a gap indicates the significance of the gap, we measure the percentage change in price from the Day -1 high to the Day 0 low. We then took the entire sample of gap sizes and broke them into size quintiles. The 5th quintile is comprised of those stocks with the largest gaps.

Table 3 shows the impact of the gap size (in quintiles) on subsequent returns for gap ups. It appears that larger gaps tend to signal that the stock is making a good upward move that may persist. As can be seen, the returns for those stocks in the 4th quartile in terms of gap size are quite strong, especially when a white candle occurred.

Table 3
Returns for Gap Up Stocks
Based on Gap Size

	Gap Size Quintile																			
	Quintile 1			Quintile 2			Quintile 3			Quintile 4			Quintile 5							
	Day 0 Candle Color			Day 0 Candle Color			Day 0 Candle Color			Day 0 Candle Color			Day 0 Candle Color							
	Black	White	All	Black	White	All	Black	White	All	Black	White	All	Black	White	All					
1 Day Return	-	0.006	0.049	0.041	-	0.214	0.039	0.065	-	0.218	0.025	0.054	-	0.135	0.020	0.005	-	0.382	0.142	0.195
3 Day Return	-	0.017	0.081	0.067	-	0.394	0.112	0.154	-	0.069	0.025	0.031	-	0.424	0.150	0.195	-	0.389	0.220	0.258
5 Day Return	-	0.017	0.152	0.131	-	0.032	0.241	0.209	-	0.227	0.278	0.270	-	0.025	0.370	0.305	-	0.208	0.292	0.180
20 Day Return	-	0.503	0.855	0.803	-	0.154	0.854	0.701	-	0.296	0.954	0.764	-	0.921	1.066	0.742	-	0.492	2.328	1.700
1 Day SPY Return	-	0.075	0.021	0.029	-	0.049	0.017	0.007	-	0.006	0.037	0.030	-	0.046	0.070	0.066	-	0.157	0.243	0.224
3 Day SPY Return	-	0.099	0.043	0.051	-	0.012	0.022	0.020	-	0.031	0.003	0.007	-	0.108	0.126	0.123	-	0.216	0.353	0.322
5 Day SPY Return	-	0.257	0.121	0.141	-	0.202	0.142	0.151	-	0.272	0.184	0.198	-	0.148	0.101	0.109	-	0.049	0.094	0.084
20 Day SPY Return	-	0.509	0.539	0.535	-	0.002	0.536	0.455	-	0.150	0.422	0.335	-	0.167	0.181	0.124	-	0.879	0.027	0.217
1 Day Mkt Adj Ret	-	0.081	0.028	0.012	-	0.263	0.021	0.058	-	0.224	0.012	0.024	-	0.088	0.090	0.061	-	0.224	0.101	0.029
3 Day Mkt Adj Ret	-	0.116	0.038	0.015	-	0.406	0.133	0.174	-	0.100	0.027	0.038	-	0.316	0.023	0.071	-	0.173	0.133	0.065
5 Day Mkt Adj Ret	-	0.240	0.031	0.010	-	0.171	0.098	0.057	-	0.045	0.093	0.072	-	0.173	0.268	0.196	-	0.159	0.386	0.264
20 Day Mkt Adj Ret	-	0.006	0.316	0.268	-	0.152	0.318	0.247	-	0.146	0.532	0.429	-	0.754	0.885	0.618	-	0.387	2.355	1.916

Next we consider the question of “How important is the gap day volume?” Traditional technical analysis theory suggests that breakouts that occur on high volume are meaningful, and Kirkpatrick and Dahlquist (2011) claim that heavy volume usually accompanies upward gaps. Nison (2001) states that high volume increases the importance of a window. Tables 4 and 5 provide results for comparing the volume on the gap day to previous short-term volume (3 days) and long-term volume (30 days) for the stock. Little insight can be gained by the data in Table 4 except for the fact that it appears that stocks that gap up on heavier volume tend to outperform those gapping up on low volume at the 20-day time horizon. Looking at volume relative to average volume over a longer time horizon appears more useful. Table 5 shows that stocks gapping up on volume higher than the 30-day average volume consistently outperform stocks that gap up on lower than average volume.

Table 4
Returns for Gap Up Stocks
Based on 3-Day Average Volume

	Below Average Volume			Above Average Volume		
	Day 0 Candle Color			Day 0 Candle Color		
	Black	White	Total	Black	White	Total
1 Day Return	-0.321	-0.143	-0.174	-0.159	0.019	-0.010
3 Day Return	-0.545	-0.048	-0.136	-0.158	-0.095	-0.105
5 Day Return	-0.226	0.088	0.032	0.080	0.333	0.291
20 Day Return	-1.718	0.493	0.101	0.283	1.455	1.263
1 Day SPY Return	-0.043	-0.194	-0.167	-0.021	-0.018	-0.018
3 Day SPY Return	-0.138	-0.127	-0.129	-0.018	-0.058	-0.052
5 Day SPY Return	0.147	-0.016	0.013	0.147	0.136	0.138
20 Day SPY Return	-0.690	-0.027	-0.145	0.001	0.476	0.398
1 Day Mkt Adj Ret	-0.278	0.052	-0.007	-0.137	0.037	0.008
3 Day Mkt Adj Ret	-0.407	0.080	-0.006	-0.140	-0.036	-0.053
5 Day Mkt Adj Ret	-0.373	0.103	0.019	-0.068	0.196	0.153
20 Day Mkt Adj Ret	-1.028	0.520	0.246	0.283	0.980	0.866

Table 5
Returns for Gap Up Stocks
Based on 30-Day Average Volume

	Below Average Volume			Above Average Volume		
	Day 0 Candle Color			Day 0 Candle Color		
	Black	White	Total	Black	White	Total
1 Day Return	0.090	-0.333	-0.206	0.156	-0.114	-0.025
3 Day Return	-0.353	-0.237	-0.272	0.038	-0.141	-0.082
5 Day Return	0.485	-0.222	-0.010	0.594	0.104	0.265
20 Day Return	1.101	-0.905	-0.304	2.117	0.736	1.191
1 Day SPY Return	0.210	-0.129	-0.028	0.040	-0.118	-0.066
3 Day SPY Return	0.089	-0.114	-0.053	-0.029	-0.101	-0.077
5 Day SPY Return	0.440	0.022	0.147	0.238	0.024	0.094
20 Day SPY Return	0.822	-0.640	-0.202	0.899	0.062	0.337
1 Day Mkt Adj Ret	-0.120	-0.204	-0.179	0.115	0.004	0.041
3 Day Mkt Adj Ret	-0.441	-0.123	-0.218	0.068	-0.039	-0.004
5 Day Mkt Adj Ret	0.045	-0.244	-0.157	0.356	0.080	0.171
20 Day Mkt Adj Ret	0.279	-0.265	-0.102	1.219	0.674	0.854

Table 6 shows the results for gaps occurring above and below the 10-day moving average of price. Gap ups that occur below the 10-day moving average of price have positive market adjusted returns for the one-, three-, five-, and 20-day time periods. This suggests that gaps occurring below a 10-day moving average are breakaway gaps, beginning an upward trend; this is especially true for gaps that have a white candle on the day the gap occurs. Gaps occurring above the 10-day moving average tend to have a below market return, suggesting that these are exhaustion gaps.

Table 6
Returns for Gap Up Stocks
Based on Gap Occurring Above or Below 10-Day Moving Average

	Below Average			Above Average		
	Day 0 Candle Color			Day 0 Candle Color		
	Black	White	All	Black	White	All
1 Day Return	-0.156	0.052	0.015	-0.251	-0.084	-0.111
3 Day Return	-0.418	0.150	0.049	-0.144	-0.260	-0.241
5 Day Return	-0.012	0.450	0.368	-0.008	0.124	0.103
20 Day Return	-1.094	0.981	0.613	0.384	1.355	1.200
1 Day SPY Return	-0.018	-0.143	-0.121	-0.036	-0.007	-0.012
3 Day SPY Return	-0.161	-0.108	-0.118	0.041	-0.054	-0.039
5 Day SPY Return	0.150	0.049	0.067	0.145	0.129	0.131
20 Day SPY Return	-0.798	-0.023	-0.161	0.313	0.612	0.564
1 Day Mkt Adj Ret	-0.138	0.195	0.136	-0.214	-0.077	-0.099
3 Day Mkt Adj Ret	-0.257	0.259	0.167	-0.185	-0.205	-0.202
5 Day Mkt Adj Ret	-0.162	0.401	0.301	-0.153	-0.005	-0.029
20 Day Mkt Adj Ret	-0.296	1.004	0.774	0.071	0.743	0.636

Tables 7 and 8 further explore the gap occurrence relative to the moving average by considering longer moving averages. Table 7 shows the returns for gaps based upon whether the gap occurs below or above the 30-day moving average, and Table 8 shows the results using a 90-day moving average. These results reinforce the idea that gaps occurring at relatively lower prices tend to outperform gaps occurring at relatively higher prices, especially at the 1- and 3-day time intervals. However, comparing these results to Table 6 we find that gaps occurring below the 10-day moving average tend to have higher returns than gaps occurring below longer moving averages.

Table 7
Returns for Gap Up Stocks
Based on Gap Occurring Above or Below 30-Day Moving Average

	Below Average			Above Average		
	Day 0 Candle Color			Day 0 Candle Color		
	Black	White	All	Black	White	All
1 Day Return	-0.266	-0.123	-0.149	-0.151	0.054	0.021
3 Day Return	-0.491	0.013	-0.078	-0.066	-0.158	-0.143
5 Day Return	-0.197	0.130	0.072	0.165	0.375	0.342
20 Day Return	-1.207	0.881	0.507	0.543	1.444	1.302
1 Day SPY Return	-0.052	-0.194	-0.169	-0.005	0.037	0.031
3 Day SPY Return	-0.146	-0.100	-0.108	0.034	-0.060	-0.045
5 Day SPY Return	0.159	-0.006	0.024	0.137	0.174	0.168
20 Day SPY Return	-0.817	0.014	-0.135	0.371	0.596	0.561
1 Day Mkt Adj Ret	-0.214	0.072	0.021	-0.146	0.016	-0.009
3 Day Mkt Adj Ret	-0.345	0.112	0.030	-0.099	-0.098	-0.098
5 Day Mkt Adj Ret	-0.356	0.136	0.048	0.028	0.200	0.173
20 Day Mkt Adj Ret	-0.390	0.867	0.642	0.172	0.848	0.741

Table 8
Returns for Gap Up Stocks
Based on Gap Occurring Above or Below 90-Day Moving Average

	Below Average			Above Average		
	Day 0 Candle Color			Day 0 Candle Color		
	Black	White	All	Black	White	All
1 Day Return	-0.235	-0.118	-0.139	-0.180	0.050	0.013
3 Day Return	-0.477	-0.032	-0.111	-0.081	-0.122	-0.115
5 Day Return	-0.263	0.112	0.045	0.225	0.389	0.363
20 Day Return	-1.223	0.966	0.575	0.552	1.374	1.244
1 Day SPY Return	-0.061	-0.204	-0.178	0.003	0.045	0.038
3 Day SPY Return	-0.151	-0.132	-0.136	0.038	-0.034	-0.023
5 Day SPY Return	0.106	-0.022	0.000	0.186	0.187	0.187
20 Day SPY Return	-0.860	-0.011	-0.163	0.407	0.614	0.581
1 Day Mkt Adj Ret	-0.174	0.086	0.039	-0.183	0.005	-0.025
3 Day Mkt Adj Ret	-0.325	0.100	0.024	-0.119	-0.088	-0.093
5 Day Mkt Adj Ret	-0.369	0.134	0.044	0.039	0.201	0.175
20 Day Mkt Adj Ret	-0.363	0.977	0.737	0.145	0.760	0.662

Gap Downs

Table 9 begins the exploration of down gaps. A gap down is a downward move; so, a trend following strategy would suggest going short when a gap down occurs. Table 2 indicates that the day following a gap down, a stock's price does indeed continue to fall. Not only does the stock price fall, but also the fall is, on average, almost two times greater than the decline in the overall market on those days. This downward movement in stock price tends to continue for the next couple of days, resulting in a three-day market adjusted return that is negative.

Table 9
Returns for Gap Down Stocks
Based on Day 0 Candle Color

	Day 0 Candle Color		
	Black	White	All
1 Day Return	-0.126	-0.348	-0.159
3 Day Return	-0.308	-0.252	-0.300
5 Day Return	0.454	0.465	0.455
20 Day Return	1.500	0.903	1.412
1 Day SPY Return	-0.001	-0.182	-0.027
3 Day SPY Return	-0.306	-0.184	-0.288
5 Day SPY Return	0.275	0.292	0.277
20 Day SPY Return	0.655	0.165	0.583
1 Day Mkt Adj Ret	-0.126	-0.165	-0.132
3 Day Mkt Adj Ret	-0.002	-0.068	-0.012
5 Day Mkt Adj Ret	0.179	0.173	0.178
20 Day Mkt Adj Ret	0.845	0.738	0.829

These results suggest going short the day after a gap down, whether the candle is black or white, but only for the next few days. The positive 5-day and 20-day price movements for the gap down stocks suggests that the downward stock price movement is short lived, and being long these stocks several days after their gap down is profitable.

Table 10 looks at this trending question a little more closely by considering the color of the candle the day before the gap occurs as well as the day of the gap. These results suggest that

the shorting strategy is most profitable when a white candle on Day -1 is followed by a gap down. Surprisingly the strongest downward move occurs when a white candle occurs on Day -1 and Day 0. In this case, a short strategy is profitable out to Day 5.

Table 10
Returns for Gap Down Stocks
Based on Day -1 Candle Color

	Day -1 Candle Color					
	Black			White		
	Day 0 Candle Color			Day 0 Candle Color		
	Black	White	All	Black	White	All
1 Day Return	-0.114	-0.339	-0.146	-0.183	-0.380	-0.216
3 Day Return	-0.280	-0.311	-0.284	-0.440	-0.032	-0.370
5 Day Return	0.488	0.623	0.507	0.298	-0.123	0.226
20 Day Return	1.731	0.983	1.625	0.433	0.608	0.463
1 Day SPY Return	-0.013	-0.199	-0.040	0.058	-0.119	0.028
3 Day SPY Return	-0.333	-0.262	-0.323	-0.182	0.107	-0.133
5 Day SPY Return	0.247	0.308	0.256	0.403	0.235	0.375
20 Day SPY Return	0.707	0.149	0.628	0.414	0.226	0.382
1 Day Mkt Adj Ret	-0.101	-0.140	-0.106	-0.241	-0.262	-0.245
3 Day Mkt Adj Ret	0.053	-0.049	0.039	-0.257	-0.139	-0.237
5 Day Mkt Adj Ret	0.240	0.315	0.251	-0.106	-0.358	-0.149
20 Day Mkt Adj Ret	1.024	0.834	0.997	0.020	0.382	0.081

Next, we consider the impact of size on the profitability of trading a gap down in Table 11. As before, the 5th quintile contains the largest relative gap sizes. These results are a bit perplexing. The fifth quintile gap downs are more likely to persist in downward price movement for the first three days following the gap. Remember, however, that on average that we found that gap downs reverse and should be traded long in the 5- and 20-day trading ranges. This is especially true for stocks making a large downward move on the gap. In fact, we find that the market adjusted 20-day return for being long the stocks in the 5th quintile is over 0.8% and for stocks in the 4th quintile is over 1%.

Table 11
Returns for Gap Down Stocks
Based on Gap Size

	Gap Size Quintile														
	Quintile 1			Quintile 2			Quintile 3			Quintile 4			Quintile 5		
	Day 0 Candle Color			Day 0 Candle Color			Day 0 Candle Color			Day 0 Candle Color			Day 0 Candle Color		
	Black	White	All	Black	White	All	Black	White	All	Black	White	All	Black	White	All
1 Day Return	0.078	0.081	0.054	-	-	-	0.011	0.364	0.037	0.089	0.346	0.126	0.490	0.518	0.495
3 Day Return	0.186	0.318	0.107	-	-	-	0.214	0.067	0.195	0.318	0.027	0.276	0.679	0.567	0.659
5 Day Return	0.473	0.431	0.466	0.328	0.685	0.376	0.370	0.683	0.410	0.723	0.678	0.717	0.396	0.011	0.322
20 Day Return	0.790	0.586	0.758	1.284	1.407	1.301	1.670	0.365	1.504	2.120	1.365	2.012	1.060	0.605	0.977
1 Day SPY Return	0.034	0.077	0.017	0.031	0.213	0.002	0.019	0.266	0.017	0.007	0.142	0.014	0.070	0.150	0.085
3 Day SPY Return	-0.095	0.094	0.095	0.204	0.214	0.205	0.237	0.110	0.221	0.310	0.130	0.284	0.533	0.272	0.485
5 Day SPY Return	0.185	0.278	0.199	0.199	0.284	0.210	0.204	0.387	0.227	0.465	0.412	0.457	0.256	0.142	0.235
20 Day SPY Return	0.222	0.568	0.276	0.566	0.389	0.542	0.795	0.120	0.710	1.116	0.306	1.000	0.215	0.151	0.148
1 Day Mkt Adj Ret	0.044	0.003	0.037	0.035	0.044	0.025	0.008	0.098	0.019	0.096	0.204	0.111	0.419	0.368	0.410
3 Day Mkt Adj Ret	0.280	0.223	0.202	0.056	0.007	0.048	0.023	0.044	0.025	0.009	0.104	0.008	0.146	0.296	0.174
5 Day Mkt Adj Ret	0.288	0.153	0.267	0.129	0.401	0.166	0.166	0.297	0.182	0.259	0.266	0.260	0.140	0.153	0.087
20 Day Mkt Adj Ret	0.567	0.019	0.482	0.719	1.019	0.759	0.875	0.245	0.795	1.004	1.060	1.012	0.845	0.756	0.828

Turning to the question of the impact of volume associated with down gaps, we see some interesting results in Table 12 and 13. While general opinion has been that volume is important when analyzing gap ups, Pring (1991) and Kirkpatrick and Dahlquist (2011) claim that volume is not an important consideration when considering gap downs. However, above average volume, measured either at the 3-day or 30-day level, for a down gap does seem to be associated with better performance of a short strategy at the one- and three-day trading time frames in our study. What is most striking, however, is the performance of the low volume down gaps. Down gaps that appear on low volume must be watched carefully. While these stocks have negative returns the day after the gap (suggesting a short strategy), they have positive returns in the 3-, 5-, and 20-day time horizons, and, especially at the 20-day time horizon, outperform the market. Down gaps occurring on light volume tend to reverse trend quickly; a long position should be taken in these stocks.

Table 12
Returns for Gap Down Stocks
Based on 3-Day Average Volume

	Below Average Volume			Above Average Volume		
	Day 0 Candle Color			Day 0 Candle Color		
	Black	White	Total	Black	White	Total
1 Day Return	-0.036	-0.120	-0.048	-0.156	-0.420	-0.194
3 Day Return	0.284	0.500	0.316	-0.504	-0.492	-0.502
5 Day Return	1.146	0.994	1.123	0.225	0.299	0.236
20 Day Return	3.171	2.502	3.073	0.952	0.380	0.868
1 Day SPY Return	0.031	-0.091	0.013	-0.011	-0.212	-0.041
3 Day SPY Return	0.040	0.441	0.099	-0.420	-0.388	-0.416
5 Day SPY Return	0.596	0.820	0.629	0.168	0.118	0.161
20 Day SPY Return	1.590	1.062	1.512	0.349	-0.128	0.279
1 Day Mkt Adj Ret	-0.066	-0.029	-0.061	-0.145	-0.208	-0.154
3 Day Mkt Adj Ret	0.244	0.059	0.217	-0.084	-0.105	-0.087
5 Day Mkt Adj Ret	0.549	0.175	0.494	0.057	0.180	0.075
20 Day Mkt Adj Ret	1.581	1.440	1.561	0.603	0.508	0.589

Table 13
Returns for Gap Down Stocks
Based on 30-Day Average Volume

	Below Average Volume			Above Average Volume		
	Day 0 Candle Color			Day 0 Candle Color		
	Black	White	Total	Black	White	Total
1 Day Return	0.002	-0.234	-0.028	-0.188	-0.389	-0.220
3 Day Return	0.134	0.534	0.186	-0.525	-0.548	-0.529
5 Day Return	1.012	1.114	1.025	0.180	0.223	0.187
20 Day Return	3.224	3.036	3.200	0.661	0.084	0.571
1 Day SPY Return	0.139	-0.227	0.092	-0.069	-0.164	-0.084
3 Day SPY Return	0.124	0.342	0.151	-0.516	-0.384	-0.495
5 Day SPY Return	0.807	0.665	0.789	0.014	0.148	0.035
20 Day SPY Return	1.717	1.231	1.655	0.139	-0.244	0.079
1 Day Mkt Adj Ret	-0.136	-0.007	-0.120	-0.120	-0.224	-0.136
3 Day Mkt Adj Ret	0.011	0.193	0.034	-0.009	-0.163	-0.033
5 Day Mkt Adj Ret	0.205	0.449	0.236	0.166	0.074	0.152
20 Day Mkt Adj Ret	1.508	1.805	1.545	0.522	0.328	0.492

Next we considered whether the gap occurred above or below the moving average of price. Table 14 displays the results for the 10-day moving average. This data highlights the fact that it is generally profitable to go short for one day after a gap down; the stocks that gap down fall more than the market the day after the gap, whether the gap occurs above or below the 10-day moving average. The negative movement of the stock price continues to the 3-day time period, but is greater in absolute value than the fall in the general market only for stocks in which the gap down occurs above the 10-day moving average.

Table 14
Returns for Gap Down Stocks
Based on Gap Occurring Above or Below 10-Day Moving Average

	Below Average			Above Average		
	Day 0 Candle Color			Day 0 Candle Color		
	Black	White	All	Black	White	All
1 Day Return	-0.177	-0.407	-0.210	-0.032	-0.241	-0.063
3 Day Return	-0.463	-0.269	-0.435	-0.018	-0.221	-0.048
5 Day Return	0.353	0.651	0.396	0.643	0.130	0.566
20 Day Return	1.455	0.654	1.339	1.584	1.353	1.549
1 Day SPY Return	-0.062	-0.255	-0.090	0.115	-0.051	0.090
3 Day SPY Return	-0.487	-0.294	-0.459	0.033	0.013	0.030
5 Day SPY Return	0.139	0.322	0.165	0.530	0.239	0.486
20 Day SPY Return	0.654	-0.064	0.550	0.656	0.577	0.645
1 Day Mkt Adj Ret	-0.115	-0.152	-0.120	-0.147	-0.190	-0.153
3 Day Mkt Adj Ret	0.024	0.024	0.024	-0.051	-0.233	-0.078
5 Day Mkt Adj Ret	0.214	0.329	0.231	0.113	-0.109	0.080
20 Day Mkt Adj Ret	0.801	0.718	0.789	0.927	0.775	0.904

Tables 15 and 16 consider longer moving averages. These two tables suggest that the stocks that are already relatively low in price (trading below their 30-day and 90-day moving averages) are the most profitable stocks to short on a gap down for the one-day and three-day time periods. However, these stocks tend to reverse direction and outperform the market at the five-day and 20-day horizons. Interestingly, stocks that experience a gap down when trading above their 30-day or 90-day moving average tend to outperform the market by over 1.3% over the next 20 days.

Table 15
Returns for Gap Down Stocks
Based on Gap Occurring Above or Below 30-Day Moving Average

	Below Average			Above Average		
	Day 0 Candle Color			Day 0 Candle Color		
	Black	White	All	Black	White	All
1 Day Return	-0.311	-0.485	-0.335	0.136	-0.184	0.085
3 Day Return	-0.885	-0.519	-0.835	0.512	0.066	0.440
5 Day Return	0.067	0.468	0.122	1.003	0.461	0.917
20 Day Return	0.655	0.029	0.569	2.699	1.943	2.578
1 Day SPY Return	-0.067	-0.291	-0.098	0.094	-0.053	0.070
3 Day SPY Return	-0.725	-0.480	-0.691	0.288	0.168	0.269
5 Day SPY Return	0.042	0.250	0.070	0.606	0.343	0.564
20 Day SPY Return	0.189	-0.291	0.123	1.317	0.708	1.220
1 Day Mkt Adj Ret	-0.244	-0.195	-0.237	0.042	-0.131	0.014
3 Day Mkt Adj Ret	-0.161	-0.039	-0.144	0.223	-0.102	0.171
5 Day Mkt Adj Ret	0.025	0.219	0.051	0.398	0.118	0.353
20 Day Mkt Adj Ret	0.467	0.321	0.447	1.382	1.235	1.358

Table 16
Returns for Gap Down Stocks
Based on Gap Occurring Above or Below 90-Day Moving Average

	Below Average			Above Average		
	Day 0 Candle Color			Day 0 Candle Color		
	Black	White	All	Black	White	All
1 Day Return	-0.314	-0.490	-0.338	0.137	-0.180	0.087
3 Day Return	-0.856	-0.529	-0.811	0.462	0.075	0.400
5 Day Return	0.090	0.454	0.140	0.964	0.478	0.887
20 Day Return	0.682	-0.013	0.586	2.649	1.985	2.543
1 Day SPY Return	-0.067	-0.289	-0.098	0.094	-0.057	0.070
3 Day SPY Return	-0.717	-0.481	-0.684	0.270	0.166	0.254
5 Day SPY Return	0.052	0.254	0.080	0.588	0.338	0.548
20 Day SPY Return	0.193	-0.313	0.123	1.304	0.729	1.212
1 Day Mkt Adj Ret	-0.247	-0.201	-0.240	0.044	-0.123	0.017
3 Day Mkt Adj Ret	-0.140	-0.048	-0.127	0.191	-0.090	0.146
5 Day Mkt Adj Ret	0.038	0.201	0.061	0.376	0.140	0.339
20 Day Mkt Adj Ret	0.489	0.300	0.463	1.345	1.256	1.330

Conclusion

It is easy to classify gaps as breakaway, runaway, or exhaustion gaps in hindsight. However, after-the-fact classification is not helpful when trading. By looking at the characteristics of unfilled gaps the day the gap occurs, we attempt to identify profitable trading positions to enter the following day. We determine that white candles on the day of the gap are associated with higher returns. Traders should also look for larger percentage gaps, gaps preceded by a black candle, gaps occurring on above average volume, and gaps occurring below the 10-day moving average of price, as these gaps are associated with above market returns. These findings are consistent with much of traditional technical analysis thought.

However, when we turn to gap downs, we find some results that are somewhat surprising. We find that gap downs tend to be followed by downward price movement only for a few days. By five days after the gap down, these stocks actual outperform the market. This is especially true for the stocks that gap down by the largest percentage. Also, stocks that gap down at above average prices are the stocks that tend to outperform the market over the next several weeks. These results suggest that down gaps may be traded in the direction of the trend (that is shorted) for a few days, but that these stocks, especially those with a large gap occurring above the average price and on low volume, are stocks to take a long position in several days after the gap.

REFERENCES

- Bukey, David, "Double Gaps," *Active Trader*, Vol. 9 (3), 2008, pp 14-20.
- Bulkowski, Thomas N., "Bulkowski's Free Pattern Research," <http://www.thepatternsite.com>, 2010.
- Edwards, Robert D. and John Magee, *Technical Analysis of Stock Trends*, Springfield, MA: John Magee, 1966.
- Farley, Alan, *The Master Swing Trader: Tools and Techniques to Profit from Outstanding Short-Term Trading Opportunities*, New York: McGraw Hill, 2000.
- Hartle, Thom and Melanie F. Bowman, "Gaps," *Technical Analysis of Stocks and Commodities*, Vol. 8 (12), 1990, pp 453-455.
- Kirkpatrick, Charles D. and Julie R. Dahlquist, *Technical Analysis: The Complete Resource for Financial Market Technicians*, Upper Saddle River, NJ: Pearson Education, Inc., 2011.
- Landry, David, *Dave Landry's 10 Best Swing Trading Patterns and Strategies*, Los Angeles, CA: M. Gordon Publishing Group, 2003.
- Nison, Steve, *Japanese Candlestick Charting Techniques*, 2nd ed., New York: New York Institute of Finance, 2001.
- Pring, Martin J., *Technical Analysis Explained*, 3rd ed., New York: McGraw Hill, Inc., 1991
- Weintraub, Neil, *Tricks of the Active Trader: An Insider's Techniques for Getting the Edge*, New York: McGraw Hill, 2007.