Understanding End of Day Strength

Introduction

In this paper we will try to determine whether strong closes in the US stock market's daily session are predictors of strength or weakness for the session(s) that follow.

Analysis

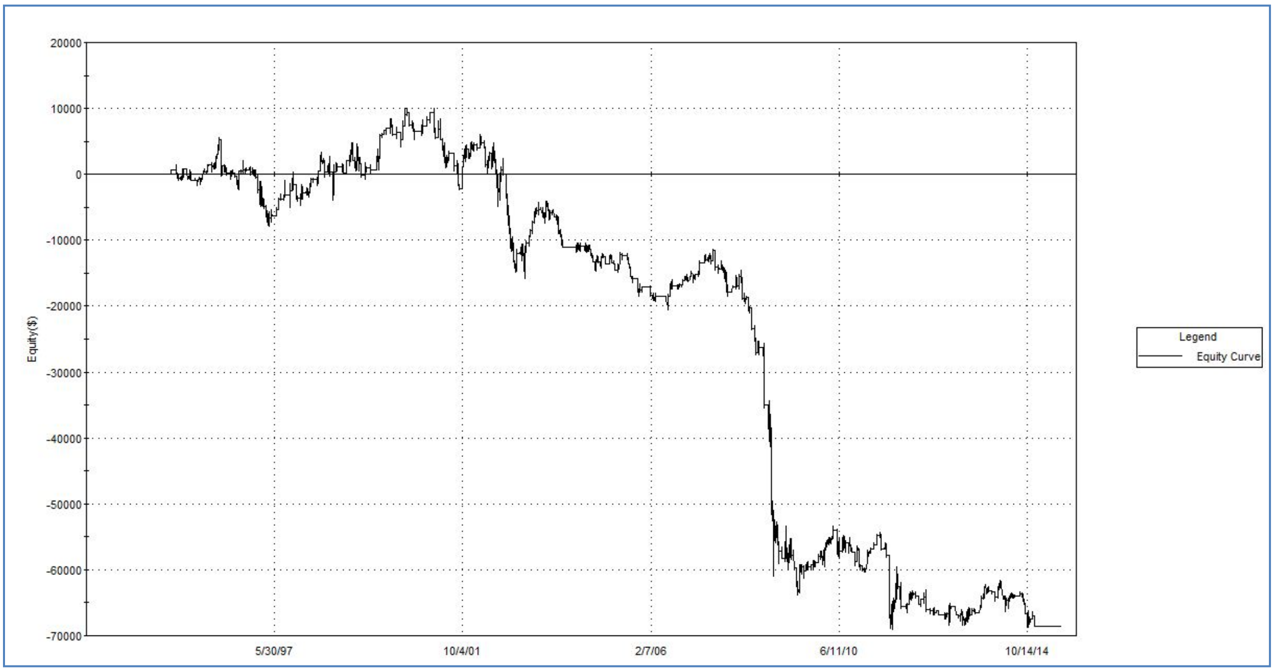
As with the *Understanding End-of-Day Weakness* study, we will rank closing values by decile, with Decile 1 representing a close in the lowest 10% of the day's trading range (high-low), Decile 2 a close within the second lowest 10% tranche, etc. The instrument we will use is the SPY (S&P500 ETF), from Jan 1 1995 to Dec 31st 2014. Table 1 shows, by decile, the results of buying the SPY at the close and selling on the next day's close:

Table 1

Decile	Trades	% Win Rate	PF
All	5035	53.51	1.09
1	553	61.12	1.69
2	441	54.42	1.22
3	399	54.14	1.17
4	407	55.53	0.93
5	398	51.51	1.08
6	449	56.12	1.14
7	456	51.54	0.94
8	500	52.60	1.10
9	643	53.81	1.16
10	652	48.47	0.77

In this paper we will focus on closes that occur in Decile 10. As we can see, systematically entering a one day long position after a Decile 10 close has historically produced win rate and profit factor statistics that are significantly worse than average (the "All" row).

It therefore appears that a very strong end-of-day close is (slightly) more often followed by a retracement than by a continued move up the following day. This is another demonstration of the short-term mean-reverting nature of the US stock market. The equity curve below shows that this strong close effect has manifested itself fairly consistent over the 1995-2014 period, albeit more noticeably from 2000 onwards.



We will now test whether the relative weakness that follows a Decile 10 close is long or short-lived. To do so, we will apply the following strategy rules:

- Enter a short position when the SPY closes in Decile 10;
- Cover the short position after X days;

The results are shown below:

Table 2

Exit After Days	Trades	% Win Rate	PF
1	652	50.77	1.31
2	597	49.41	1.24
3	539	43.60	1.08
4	489	44.99	1.00
5	428	44.63	0.96

Clearly the mean-reversion effect that follows a strong close is very short lived. After day 1, and consistently thereafter, the market's "structural inflation" reasserts itself and prices tend to rise again after the brief 1 day pullback. The Decile 10 effect is therefore a brief affair, best described as a day of profit-taking that follows a day of buying exuberance.

We now look at whether Decile 10 closes on specific days of the week exhibit stronger or weaker returns:

Table 3

Day of week	Trades	% Win Rate	PF
All Decile 10	652	50.77	1.31
Mon	121	51.24	1.05
Tue	149	53.02	1.45
Wed	124	46.77	1.05
Thu	130	53.08	1.60
Fri	128	49.22	1.41

Table 3 above show results by day of week. As we can see, the profit factors of 24hr short positions taken on Tuesdays and Thursdays are somewhat better than those taken on other days of the week. However, win rates are fairly consistent for all days of the week, all gravitating around the 50% mark. So no one day of the week stands out as being particularly prone to the Decile 10 effect.

We will now apply a number of filters to further explore Decile 10 closes. The filters are short-term market condition, long-term market condition, volume and daily range. For ease of analysis, these will be defined as follows:

- Short Term Market Condition: a close above or below the 10 day moving average;
- Long Term Market Condition: a close above or below the 200 day moving average;
- Volume: daily volume above or below the average daily volume of the past 10 days;
- Range: daily range (H-L) above or below the average daily range of the past 10 days;

Table 4 shows the results of a 24hr short position in the SPY following a Decile 10 close under the conditions above:

Table 4

Variable	Condition	Trades	% Win Rate	PF
All Decile 10	All	652	50.77	1.31
ST Market Condition	Above 10 DMA	511	50.88	1.32
ST Market Condition	Below 10 DMA	141	50.35	1.28
LT Market Condition	Above 200 DMA	458	49.78	1.10
LT Market Condition	Below 200 DMA	194	53.09	1.58
Volume	Above 10 day avg	286	51.75	1.47
Volume	Below 10 day avg	366	50.00	1.17
Range	Above 10 day avg	350	52.86	1.47
Range	Below 10 day avg	302	48.34	1.14

The results here are not particularly telling. Win rate numbers all remain within the high 40's to low 50's range. Nevertheless, we can note that 1 day Decile 10 short positions taken during bearish market conditions have proven marginally more profitable than average, as have those that were taken when volume or daily range were above average.

We will now combine both short and long-term market conditions in our analysis, as follows:

- Go short if the SPY closes within the top 10% of its daily range *and* the day's range is greater than the average daily range of the past 10 days. Exit at next day's close;
- Filter 1: only if close is above/below the 10 day moving average;
- Filter 2: only if close is above/below the 200 day moving average;

Note that, in order to keep the number of trades as high as possible, we will not use the volume filter.

Table 5

LT Market Condition	ST Market Condition	Trades	% Win Rate	PF
Above 200 DMA	Above 10 DMA	193	52.33	1.43
Above 200 DMA	Below 10 DMA	47	48.94	1.03
Below 200 DMA	Above 10 DMA	72	48.61	1.12
Below 200 DMA	Below 10 DMA	38	68.42	2.89

The low number of trades means that these results should be interpreted with caution. Still, we can note that Decile 10 closes during bull markets are generally more prone to 1 day pullbacks when the market is already short-term overextended (above the 10 DMA). Similarly, Decile 10 closes during bear markets are more prone to 1 day pullbacks when the short-term market is also squarely bearish (below the 10 DMA).

Summary

As we have seen, the US stock market has a tendency to exhibit mild short-side mean-reversion after strong daily closes. This tendency is considerably less marked than the long-side mean-reversion that typically follows very weak daily closes. Moreover the effect is brief, lasting no longer than one trading session.

Volume, daily range and short/long-term market condition all impact the Decile 10 effect, albeit only marginally. Combining filters undoubtedly improves the data, but lowers the statistical significance of the results, and hence its applicability to a systematic trading system.

Traders wishing to incorporate these findings into their trading plan could consider timing long exits on Decile 10 closes (particularly when the short-term market is overextended upwards in a bull market), or timing short entries on Decile 10 closes (particularly when the short-term market is overextended downwards in a bear market).