Mean Reversion Basics (Exit Strategies)

Introduction

In earlier chapters of this study we looked at how the *size* and/or the *persistence* of a directional move in the S&P500 - up or down - historically affected the likelihood of the market experiencing mean reversion the following day. We also looked at whether different market *states,* be they short-term oversold/overbought or long-term bearish/bullish, affected the tendency of prices to bounce after a drop or pull back after a rally.

In this chapter we will look at a number of different exit strategies that are typically employed in multi-day "swing-trading" trading systems. We will quantify the historical results achieved using the different exit rules, and then compare the respective pros and cons of each approach.

Entry Rules

Our sample strategy will be:

System data:

- Instrument: INX (S&P500 Index) from Jan 1st 1995 to Dec 31st 2014 (20 years)
- Capital per trade: US$ 1,000,000 (no compounding)

Entry rules:

- Enter long at the close if:
  - The closing price is at least 2% below the 10 day simple moving average
  - This is the 1st trigger since prices last fell below the 10 day SMA
  - The market is in a long-term uptrend (Golden Cross state)

Time-Based Exit

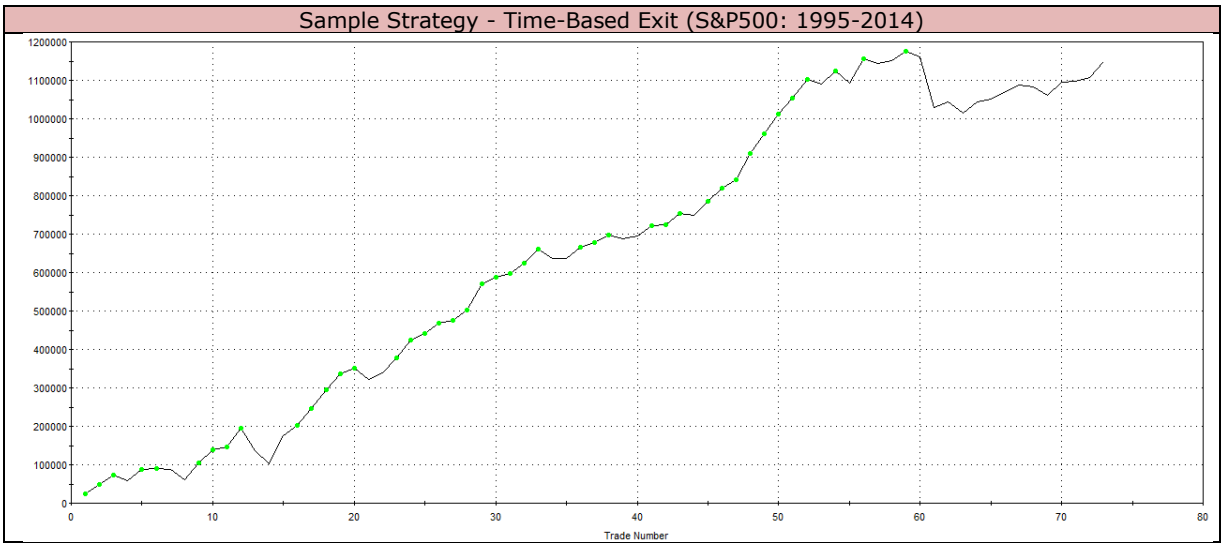
In the first test we will employ a simple time based exit: the system will simply close the long position after a specific number of trading days.

Exit Rule:

- Exit at the close after exactly X days.

Sample Strategy - Time-Based Exit (S&P500: 1995-2014)				
Exit after Days	$ Net Profit	Trades	% Win Rate	Profit Factor
2	164,068	80	63.74	1.33
4	550,765	79	65.82	2.13
6	739,428	76	71.05	2.14
8	1,147,756	73	76.71	3.48
10	1,154,820	68	72.06	3.32
12	1,130,498	65	72.31	3.26
14	921,585	62	70.97	2.44
16	763,342	59	67.80	2.09

The table above shows that this seemingly crude approach was surprisingly effective at generating good trade statistics for the period under review. Most equity-based swing-trading strategies tend to peak between day 5 and day 8, and we can see this is also the case here. Systematically closing the position after 8 days, with no additional exit rules or conditional filters, would have generated an overall win rate of 77% and a profit factor of 3.48.
Below is the equity curve for the 8 day system:



Target/Stop Based Exit

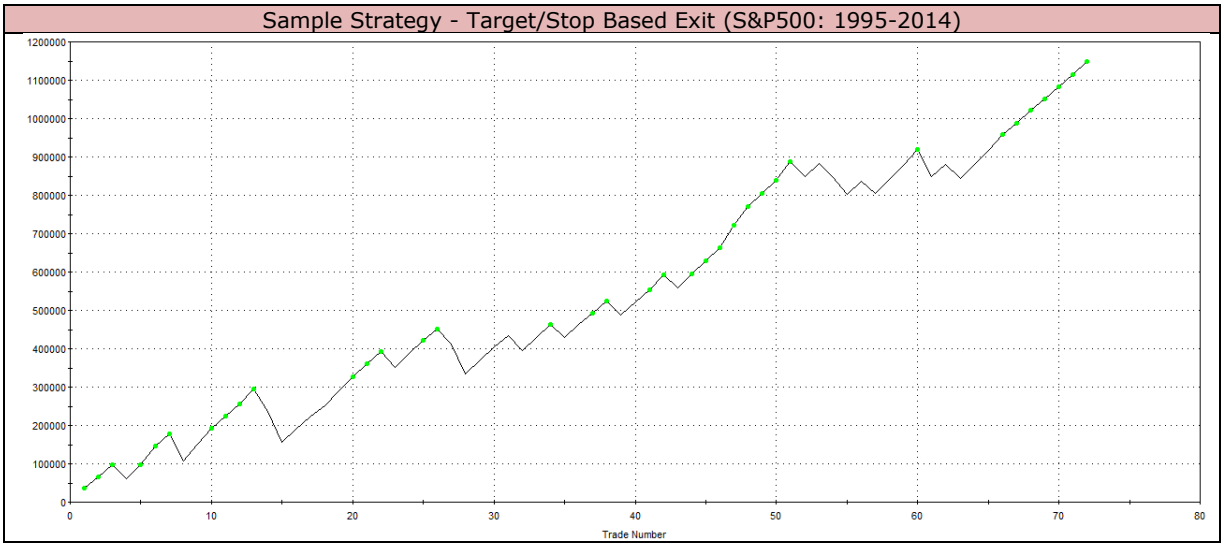
In the second test below we will employ a more conventional bracket exit: the system will close the long position either for an X % win (target) or for an X % loss (stop).

Exit Rule:

- Exit at a close that is at least X% higher or X % lower than the entry price.

Sample Strategy - Target/Stop Based Exit (S&P500: 1995-2014)				
Exit at % tgt/stop	$ Net Profit	Trades	% Win Rate	Profit Factor
1.0 %	265,165	79	60.76	1.45
1.5 %	414,899	77	63.64	1.57
2.0 %	705,119	77	70.13	1.95
2.5 %	942,011	76	73.68	2.27
3.0 %	1,148,683	72	76.39	2.43
3.5 %	1,114,783	68	73.53	2.28
4.0 %	1,161,397	63	73.02	2.27

The table above shows that trading results peaked using a target and stop value of 3%. The 76.4% win rate is fairly good, but the fairly modest profit factor of 2.43 - although still very profitable - compares unfavourably to that generated using the time-based exit rules. Below is the resulting equity curve. As we can see, forcing the strategy to exit at a fixed stop level tends to increase the number of losing trades and makes for a somewhat choppier equity curve.



Dynamic Exit

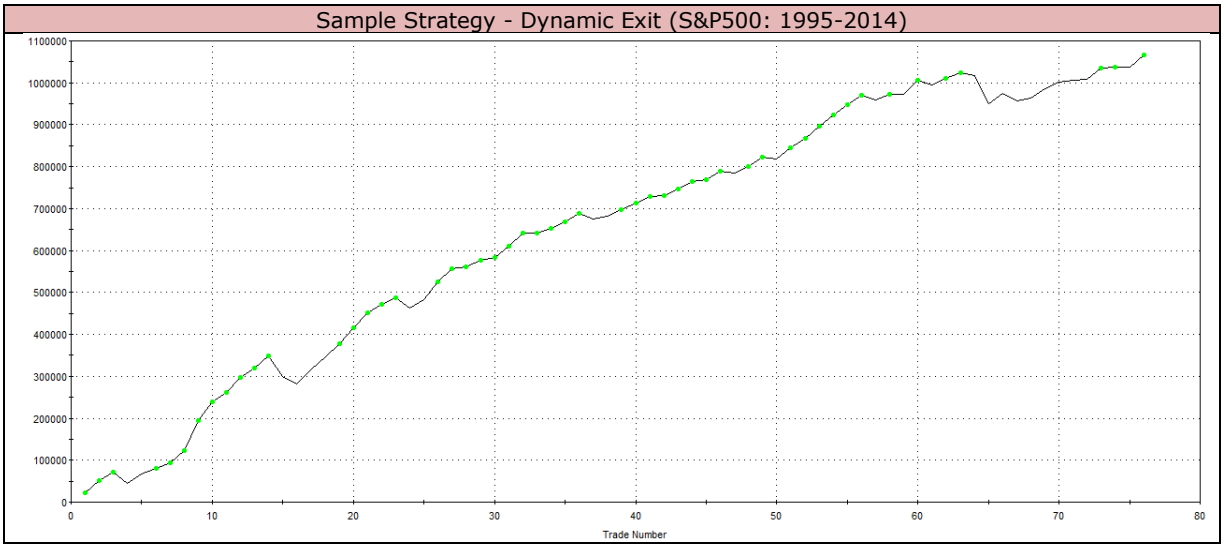
In the third test we will use a dynamic exit: the system will close the long position when daily prices close above the X day simple moving average.

Exit Rule:

- Exit at the first close above the X day simple moving average

Sample Strategy - Dynamic Exit (S&P500: 1995-2014)				
Exit above the	$ Net Profit	Trades	% Win Rate	Profit Factor
5 day MA	731,042	79	77.22	3.65
10 day MA	1,066,575	76	81.58	5.16
15 day MA	1,074,274	73	83.56	4.39

Results here are very good and peak (at least when it comes to PF data) when using the 10 day SMA. And while the absolute dollar net profit figure is not quite as high as that of the previous two systems, both the win rate and profit factor results are considerably better. Unencumbered by fixed exit parameters (i.e. time or target) this type of exit scheme, favoured by many swing-traders, allows the edge that generated the trade to express itself in its own time. Below is the equity curve using the 10 day SMA as the exit parameter.



Hybrid Exit

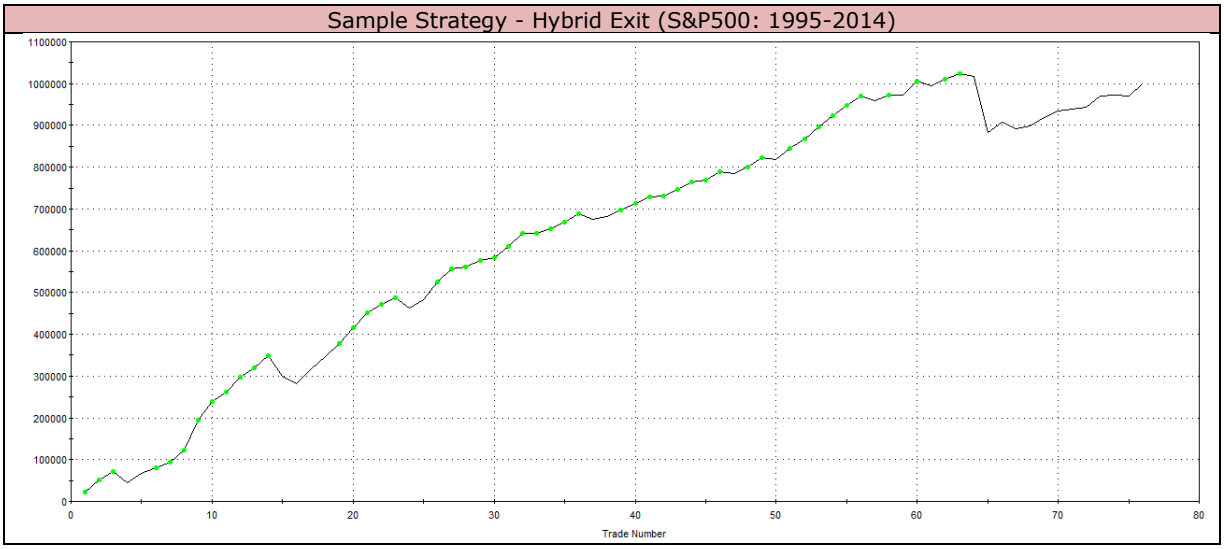
In the fourth and last test we will use a hybrid exit: the system will close the long position when daily prices close above the 10 day simple moving average (dynamic exit) *or* they close below a specific % stop level.

Exit Rule:

- Exit at the first close above the X day simple moving average or at the first close below an X % stop

Sample Strategy - Hybrid Exit (S&P500: 1995-2014)				
Exit above 10DMA or % stop	$ Net Profit	Trades	% Win Rate	Profit Factor
2.0	627,290	78	73.08	1.94
4.0	726,967	78	79.49	2.18
6.0	904,205	76	80.26	3.20
8.0	937,564	76	81.58	3.43
10.0	1,000,762	76	81.58	4.11

Performance statistics here are comparable to those generated with the dynamic exit. Interestingly, the best results were obtained using the very high 10% stop level, which was in fact hit only once in 76 trades. Below is the equity curve for this system.



Summary

Exit Strategy Comparison							
Exit Strategy	Trades	Avg Days / trade	Total $ Net Profit	Avg. Trade $ Net Profit	% Win Rate	Profit Factor	$ Max Drawdown
Time (8 days)	73	8	1,147,756	15,723	76.71	3.48	-178,696
Target/Stop (3%)	72	9.5	1,148,683	15,951	76.39	2.43	-143,869
Dynamic (10DMA)	76	6	1,066,575	14,034	81.58	5.16	-153,709
Hybrid (10DMA/10%)	76	6	1,000,762	13,168	81.58	4.11	-162,346

The table above shows the best result for each of the four exit systems used in this study. To summarize:

- Time and target/stop based exit rules generated the highest total net profit results. These were approximately 10% higher than those achieved by the dynamic and hybrid exit rules.
- The absence of "hard" pre-determined exit levels (time or stop) gave the dynamic and hybrid trades more opportunity to close positively. This resulted in very high win rates of 81.6% and equally high profit factor results (5.16 and 4.11). This is reflected in the comparatively smooth equity curves for these two exit schemes.
- The simple time-based exit system incurred the highest maximum drawdown, while the target/stop based system, with its relatively low stop level of 3%, incurred the lowest maximum drawdown.
- The duration of the average trade varied quite considerably. The target/stop system had the longest average trade (9.5 days), followed by the time-based system (8 days). The dynamic and hybrid systems had noticeably shorter average trades (6 days), with winners closing on average after 5 days and losers after 10.
- It should be noted that different strategies respond *very* differently to specific exit system. The same set of exit rules may work very well for a specific strategy and potentially disastrously for another. So there is no such thing as a "good" or "bad" exit scheme, just one that is more or less relevant to a specific set of entry rules and to the objectives of each trader (high profit factor vs low max drawdown, etc).