Connors Research Trading Strategy Series

Trading Stocks and Options with Moving Averages - A Quantified Approach

By

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Table of Contents

Section 1

Introduction

Indicators are not always what they appear to be. Moving averages are widely used as a trend-following tool. In many of the trading strategies that we have developed over the years, the 200-day moving average (MA) is used to identify the direction of the trend. We have found that taking buy signals only when the price is above the 200-day MA can improve profitability in many systems.

Recently, we completed research that shows moving averages can also be used as part of a strategy to find short-term, mean reversion trading opportunities. This may be surprising to some traders because it might seem odd to use a trend-following indicator like MAs in a short-term, mean reversion strategy.

While MAs are used in this strategy, the MA is not being applied in its traditional way. As we highlighted in the 2004 book *How Markets Really Work*, it is important to develop unique insights into the behavior of prices.

In *How Markets Really Work*, we tested common knowledge and discovered it was not always best to follow widely accepted market truths. We found that it was best to buy short-term weakness, for example, and research showed that selective buying when market breadth was poor was more profitable than buying when market breadth indicators were uniformly positive. We also discovered that changes in volume were irrelevant to making buy and sell decisions despite the widespread belief among traders that volume is needed to confirm an uptrend.

We have continued that type of research and we always look at data rather than widely accepted truths. In doing so, we found that moving averages (MAs) can be used as short-term timing tools.

Traditionally, MAs are usually used as trend-following tools. Buy signals are given when prices close above the MA and sell signals result from closes below the MA. While they can be used profitably in this way, there are also a number of problems associated with MAs.

When a market is range-bound, which is most of the time, traders experience a number of whipsaw trades while waiting for the next trend to emerge. Whipsaw trades are entries that are quickly reversed. Commissions and other trading costs can be substantial when prices whip back and forth around the moving average and those costs decrease profits.

Signals based on MAs will also always be late. This is by design since MAs trail the market. However, these delays can lead to missing large price moves. The price of SPDR S&P 500 ETF (NYSE: SPY) increased more than 30% after bottoming in March 2009, for example, before long-term MAs gave buy signals.

Systems based on MAs generally have low win rates and a majority of the system profits come from only a few of the trades. Most trades end in only small gains or losses that result from whipsaws.

These problems make MAs difficult to trade. In back-testing over long periods, they seem to be profitable but in real-time, the delayed signals and large number of losing trades lead many traders to abandon the system.

We viewed the problems of MAs as an opportunity to develop a trading system based on mean reversion.

Whipsaws are caused by the binary nature of the MA system. It is always either in or out of the market, or is always long or short, based on the interaction of the MA with prices. We can reduce this problem by defining rules that only take high probability trades. Many markets are untradeable the majority of the time and rules can be designed to recognize when the market is at an extreme and trade only under the right conditions.

Another weakness of MA systems is that they give back large amounts of profits after the trend reverses before they exit or they require delays that miss large profits before entering trades. This is caused by the fact that prices move significantly away from the MA when markets are trending. Some traders address this problem by closing trades when prices deviate too far from an MA, which leads to another problem because strong trends will be missed and the profitability of the system will be reduced. We address the problem of by using two MAs which minimizes the delays at turning points.

All of the strategy rules are fully detailed in the next section. This is a powerful new way to use MAs that can deliver profits in any market.

Section 2

Strategy Rules

Moving averages are generally used to follow the trends. Some traders will use MAs to help identify overbought or oversold markets. This approach usually involves identifying when the price has moved too far from the MA. To determine when prices are too far from an MA, channels, based on percentages or standard deviations, are often added to the MA. Channels fail to identify strength and are invariably wrong during the market's largest advances or declines.

The *Quantified Moving Average Strategy* uses two moving averages to reduce the probability of being wrong at major market turns. Both moving averages will move along with prices and the relationship between the two averages will highlight oversold market extremes.

This strategy executes trades using a simple three-step process consisting of Setup, Entry and Exit. The rules for each of these steps are detailed below.

A Quantified Moving Average Strategy **Setup** occurs when all of the following conditions are true:

1. The stock's price must be above $5.
2. The stock's average daily volume over the past 21 trading days (approximately one month) must be at least 250,000 shares.
3. The historical volatility over the past 100 days, or HV(100), must be greater than 30. (See the Appendix for a definition of historical volatility).
4. Today's close must be above the 200-day moving average, or MA(200).
5. The fast MA is at least Y% below the slow MA where Y = 2.5, 5.0, 7.5, or 10.0%. The following MA scenarios will be tested:

Scenario	Fast MA	Slow MA
1	MA(C,5)	MA(C,10)
2	MA(C,5)	MA(C,20)
3	MA(C,5)	MA(C,50)
4	MA(C,10)	MA(C,20)
5	MA(C,10)	MA(C,50)

If the previous day was a Setup, then we **Enter** a trade by:

6. Submitting a limit order to buy the stock at a price X% below yesterday's close, where X is 2, 4, 6, 8 or 10%.

After we've entered the trade, we **Exit** using one of the following methods, selected in advance:

7a. The closing price of the stock is higher than the previous day's close. We typically refer to this exit as the *First Up Close*.
7b. The stock closes with a ConnorsRSI value greater than 50.
7c. The stock closes with a ConnorsRSI value greater than 70.
7d. The closing price of the stock is greater than the 3-day moving average, or MA(3).
7e. The closing price of the stock is greater than the 5-day moving average, or MA(5).

Let's look at each rule in a little more depth, and explain why it's included in the strategy.

Rules 1 & 2 assure that we're in highly liquid stocks which can be readily bought and sold with tight bid/ask spreads that reduce trading costs.

Rule 3 assures that the stock has enough volatility to allow for large moves.

Rule 4 identifies the direction of the long-term trend. By requiring the close to be above the 200-day MA, we are finding stocks that are oversold but remain in a long-term uptrend.

Rule 5 identifies short-term oversold extremes.

Rule 6 allows us to enter the trade at an optimal price. The Setup rules identify an oversold stock and the entry rule waits for it to become even more oversold on an intraday basis.

Rule 7 provides a well-defined exit method. Few strategies have quantified, structured, and disciplined exit rules. **Rule 7** gives you the exact parameters to exit the trade, backed by over 12.75 years of historical test results. As with all other strategy parameters, we select in advance the type of exit that we will use, and apply that rule consistently in our trading.

Rules 7b and **7c** use ConnorsRSI to define the exit. In the past, many of our strategies used a 2-day RSI, or RSI(2) to identify overbought and oversold conditions. Our recent research has shown ConnorsRSI to be a more effective indicator. If you're not familiar with ConnorsRSI, details can be found in the Appendix.

In our testing we closed all trades at the close of trading on the day that the Exit signal occurred. If this is not an option for you, our research has generally shown that similar results are achieved if you exit your positions at or near the open the next morning.

Now let's see how a typical trade looks on a chart.

For the example below, we'll use a strategy variation that requires the 5-day MA to be more than 10% below the 20-day MA on the Setup day. The limit order will be placed 6% below the Setup day's closing price. We will exit when the ConnorsRSI is greater than 70, the exit method defined by **Rule 7c**.

Chart created in TradingView. Reprinted courtesy of TradingVew.com.

Figure 1: Smith & Wesson Corp. (SWHC) Trade

The chart above is for *Smith & Wesson Holding Corp.* whose symbol is SWHC. In the chart, the top pane shows the price bars in black, the 5-day MA or MA(5) in blue and the 20-day MA or MA(20) in green. The green arrow shows when the trade was entered and the red arrow highlights the day the Exit rule is triggered.

Rule 1 is satisfied because the stock's closing price is $7.96 on August 22, 2012, well above the minimum value of $5.

Rule 2 is met because the average daily volume on the day the Setup is completed is more than 1.9 million, above the minimum of 250,000.

Rule 3 requires the historical volatility over the past 100 days, or HV(100), to be greater than 30 on the day the Setup is completed. The actual value of HV(100) on that day was 67.64.

Rule 4 is satisfied because SWHC closed at $7.96, above the 200-day MA which was $6.43 on that day.

Rule 5 requires the fast MA is at least Y% below the slow MA where Y = 2.5, 5.0, 7.5, or 10.0%. We are using 5-days for the fast MA and 20-days for the slow MA with Y = 10.0%.

The 5-day MA was $8.09 and the 20-day MA was $9.24 on August 22. In this case, the fast MA was more than 12% below the slow MA. The relationship between the two MAs can be found with the following formula:

Percent above/below = ((Fast MA / Slow MA) – 1) * 100
= (($8.09 / $9.24) – 1) * 100
= ((0.8756) – 1) * 100 = -12.44%

If the fast MA is above the slow MA, this value would be positive.

Since all five Setup rules have been satisfied, we enter a limit order for the next trading day, which is August 23rd. Our selected strategy variation tells us to use a limit 6% below the Setup day's closing price **(Rule 6)**, so we would use a limit price of:

Limit Price = Close x (1 - Limit %)
= $7.96 x 0.94 = $7.48

On August 23rd the price of SWHC dropped as low as $7.40, so our limit order gets filled and we buy the stock at the limit price of $7.48.

On the next trading day, August 24th, the price of SWHC closed at $8.05. The ConnorsRSI moved up to 72.22. This is above 70, triggering our Exit **(Rule 7c)**. We close our position at or near the closing price of $8.05, which gives us a profit on the trade of 7.6% before commissions and fees:

Profit = Gain (or Loss) / Cost Basis

= ($8.05 - $7.48) / $7.48

= $0.57 / $7.48 = 7.6%

Let's look at another example using slightly different trade parameters. In this example, we will require the 5-day MA to be more than 5% below the 20-day MA on the Setup day. The limit order will be placed 8% below the Setup day's closing price. We will exit when the price closes above the 5-day MA, the exit method defined by **Rule 7e**.

The chart below is for *Spreadtrum Communications* (SPRD), and uses the same conventions as the previous chart.

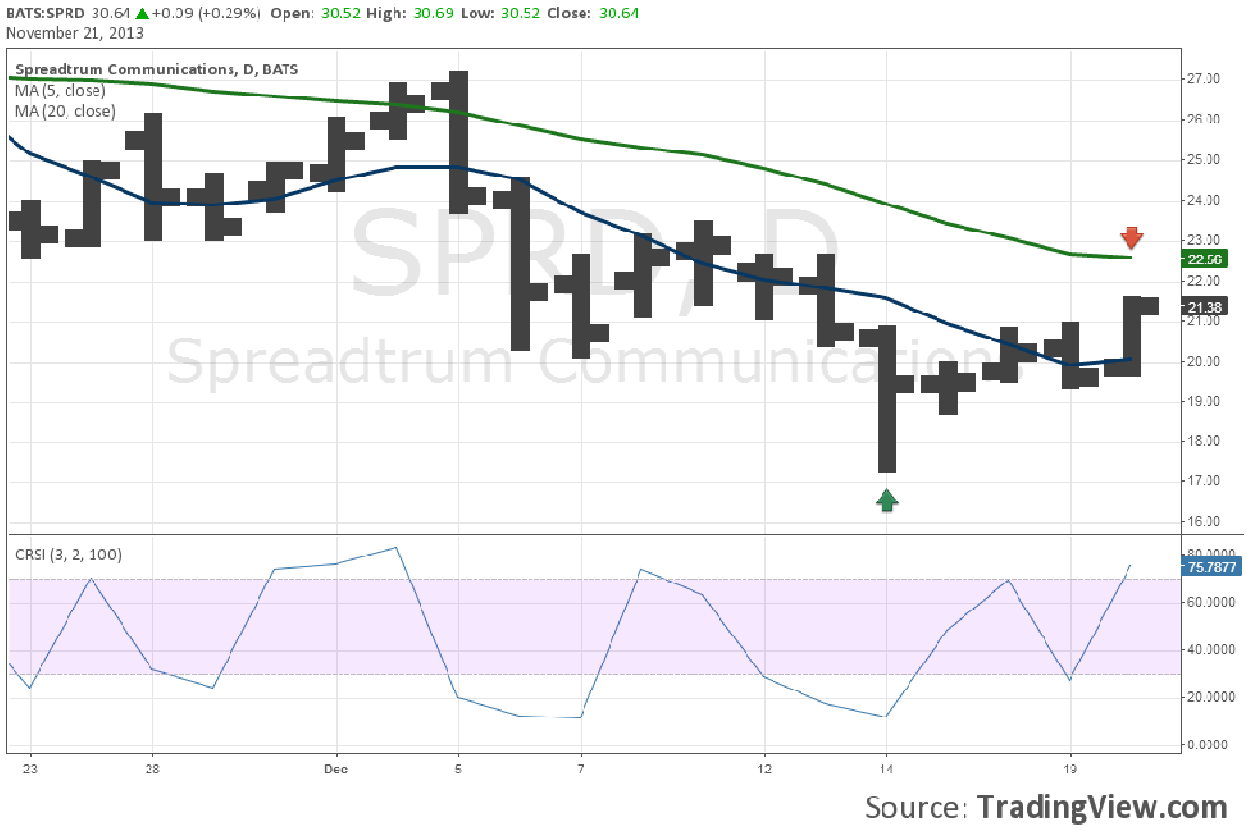


Chart created in TradingView. Reprinted courtesy of TradingVew.com.

Figure 2: Spreadtrum Communications Inc. (SPRD) Trade

The Setup day for this trade was December 13, 2011. As per **Rule 1**, the closing price is above $5 at $20.74. **Rule 2** is met because the average daily volume on the day the Setup is completed is above 1.9 million shares, above the minimum of 250,000. **Rule 3** is satisfied because the HV(100) is 77.60. **Rule 4** is taken care of when SPRD closed at $20.74, above its 200-day MA of $19.50.

Rule 5 requires the fast MA is at least Y% below the slow MA where Y = 2.5, 5.0, 7.5, or 10.0%. We are using 5-days for the fast MA and 20-days for the slow MA with Y = 5.0%.

The 5-day MA was $21.82 and the 20-day MA was $24.39 on December 13th. In this case, the fast MA was nearly 11% below the slow MA. The relationship between the two MAs can be found with the following formula:

Percent above/below = ((Fast MA / Slow MA) – 1) * 100
= (($21.82 / $24.39) – 1) * 100
= ((0.8946) – 1) * 100 = -10.54%

With all of our Setup conditions met, we are ready to place a limit order for the next day. Since SPRD closed at $20.74, the limit order will be placed at $19.08 ($20.74 * 0.92) as per **Rule 6**.

On December 14th, the price of SPRD hit an intraday low of $17.51, which is below our limit price, so our order gets filled and we enter the trade.

The Exit is triggered on December 20, when SPRD closed at $21.38, above its 5-day MA for the first time since the trade was entered.

This trade would have generated a profit of approximately 12.1% before commissions and fees.

Now that you have a good understanding of the trade mechanics, we'll look at the historical test results for different variations of the strategy.

Section 3

Test Results

We can never know for sure how a trading strategy will perform in the future. However, for a fully quantified strategy such as the one described in this Guidebook, we can at least evaluate how the strategy has performed in the past. This process is known as "back-testing".

To execute a back-test, we first select a group of securities (sometimes called a watchlist) that we want to test the strategy on. In our case, the watchlist consists of non-leveraged stocks.

Next we choose a timeframe over which to test. The longer the timeframe, the more significant and informative the back-testing results will be. The back-tests for this Guidebook start in January 2001 and go through the end of September 2013, the latest date for which we have data as of this writing.

Finally, we apply our entry and exit rules to each stock in the watchlist for the entire test period, recording data for each trade that would have been entered, and aggregating all trade data across a specific strategy variation.

One of the key statistics that we can glean from the back-tested results is the *Average % Profit/Loss*, also known as the *Average Gain per Trade*. Some traders refer to this as the *edge*. The Average % P/L is the sum of all the gains (expressed as a percentage) and all the losses (also as a percentage) divided by the total number of trades. Consider the following ten trades:

Trade No.	% Gain or Loss
1	1.7%
2	2.1%
3	-4.0%
4	0.6%
5	-1.2%
6	3.8%
7	1.9%
8	-0.4%
9	3.7%
10	2.6%

The Average % P/L would be calculated as:

Average % P/L = (1.7% + 2.1% - 4.0% + 0.6% - 1.2% + 3.8% + 1.9% -0.4% + 3.7% + 2.6%) / 10
Average % P/L = 1.08%

Average % P/L is the average gain based on invested capital, i.e. the amount of money that we actually spent to enter each trade.

For short-term trades lasting three to ten trading days, most traders look for an Average % P/L of 0.5% to 2.5% across all trades. All other things being equal, the larger the Average % P/L, the more your account will grow over time. Of course, all other things are never equal! In particular, it's important to consider the Number of Trades metric in combination with Average % P/L. If you use approximately the

same amount of capital for each trade that you enter, you'll make a lot more money on ten trades with an average profit of 4% per trade than you will on one trade that makes 10%.

Another important metric is the *Winning Percentage* or *Win Rate*. This is simply the number of profitable trades divided by the total number of trades. In the table above, 7 of the 10 trades were profitable, i.e. had positive returns. For this example, the Winning Percentage is 7 / 10 = 70%.

Why do we care about Win Rate, as long as we have a sufficiently high Average % P/L? Because higher Win Rates generally lead to less volatile portfolio growth. Losing trades have a way of "clumping up", and when they do that, the value of your portfolio decreases. This is known as *drawdown*. Those decreases, in turn, can make you lose sleep or even consider abandoning your trading altogether. If there are fewer losers, i.e. a higher Winning Percentage, then losses are less likely to clump, and your portfolio value is more likely to grow smoothly upward rather than experiencing violent up and down swings.

* * *

Let's turn our attention to the test results for the different variations of the *Quantified Moving Average Strategy*.

The table below sorts the test results to show the 20 variations that produced the highest Average % P/L. All variations that generated fewer than 100 trade signals during the 12+ year testing period have been filtered out to avoid skewing the results.

Top 20 Variations Based on Average Gain

# Trades	Avg % P/L	Avg Days Held	Win %	MA Scenario	MA Stretch	Limit %	Exit Method
160	5.51%	3.8	75.63%	MA(5)/MA(10)	10.0	10	Close > MA(5)
166	5.14%	3.9	69.28%	MA(10)/MA(20)	10.0	10	Close > MA(5)
236	4.99%	4.3	68.64%	MA(10)/MA(20)	10.0	10	CRSI > 70
980	4.78%	3.9	73.47%	MA(5)/MA(10)	5.0	10	Close > MA(5)
591	4.76%	4.0	70.56%	MA(5)/MA(20)	10.0	10	Close > MA(5)
712	4.52%	4.5	69.24%	MA(5)/MA(20)	10.0	10	CRSI > 70
360	4.51%	4.0	70.28%	MA(5)/MA(10)	7.5	10	Close > MA(5)
246	4.50%	3.9	70.73%	MA(5)/MA(10)	10.0	8	Close > MA(5)
175	4.49%	4.7	69.71%	MA(5)/MA(10)	10.0	10	CRSI > 70
379	4.48%	4.0	70.18%	MA(10)/MA(20)	7.5	10	Close > MA(5)
525	4.40%	4.5	69.52%	MA(10)/MA(20)	7.5	10	CRSI > 70
617	4.26%	3.7	71.15%	MA(5)/MA(10)	7.5	8	Close > MA(5)
267	4.24%	4.7	69.29%	MA(5)/MA(10)	10.0	8	CRSI > 70
1,125	4.23%	4.1	70.76%	MA(5)/MA(20)	7.5	10	Close > MA(5)
273	4.17%	3.9	68.86%	MA(10)/MA(20)	10.0	8	Close > MA(5)
1,074	4.16%	4.7	70.86%	MA(5)/MA(10)	5.0	10	CRSI > 70
874	4.10%	2.4	72.20%	MA(5)/MA(10)	5.0	10	Close > MA(3)
395	4.08%	4.4	69.87%	MA(10)/MA(20)	10.0	8	CRSI > 70
1,731	4.04%	3.8	73.43%	MA(5)/MA(10)	5.0	8	Close > MA(5)
394	3.93%	4.5	68.27%	MA(5)/MA(10)	7.5	10	CRSI > 70

Below is an explanation of each column.

 # Trades is the number of times this variation triggered from January 1, 2001 – September 30, 2013.

Avg % P/L is the average percentage profit or loss for all trades, including the losing trades, based on invested capital. The top 20 variations show gains ranging from 3.93% to 5.51% over the 12+ year testing period.

Avg Days Held is the average trade duration expressed as a number of days. The range for the variations above is relatively small, averaging just over 4 days.

Win % is the percentage of simulated trades which closed out at a profit. Most of the top 20 variations have win rates in the low-70s. This is a high percentage of profitable trades in a world where many traders are aiming for 50-60%.

MA Scenario defines the two moving averages used in the test. This corresponds to **Rule 5** and shows the values for the fast and slow MAs. The following MA scenarios were tested:

Scenario	Fast MA	Slow MA
1	MA(C,5)	MA(C,10)
2	MA(C,5)	MA(C,20)
3	MA(C,5)	MA(C,50)
4	MA(C,10)	MA(C,20)
5	MA(C,10)	MA(C,50)

MA stretch corresponds to the value of Y in **Rule 5** of the strategy. This column shows the value of Y for the rule which says, "the fast MA is at least Y% below the slow MA where Y = 2.5, 5.0, 7.5, or 10.0%."

Limit % is related to **Rule 6** of the strategy and determines the limit price that will be used to enter the trade. We tested limits of 2, 4, 6, 8 or 10% below the Setup day's close.

Exit Method is the rule that was used to exit trades in this strategy variation, as described in **Rule 7**.

Next, let's look at the strategy variations that have historically had the highest frequency of profitable trades or Win Rate.

Top 20 Variations Based on Highest Win Rate

# Trades	Avg % P/L	Avg Days Held	Win %	MA Scenario	MA Stretch	Limit %	Exit Method
160	5.51%	3.8	75.63%	MA(5)/MA(10)	10.0	10	Close > MA(5)
980	4.78%	3.9	73.47%	MA(5)/MA(10)	5.0	10	Close > MA(5)
1,731	4.04%	3.8	73.43%	MA(5)/MA(10)	5.0	8	Close > MA(5)
2,956	3.09%	3.6	73.04%	MA(5)/MA(10)	5.0	6	Close > MA(5)
2,012	3.60%	3.9	72.47%	MA(5)/MA(20)	7.5	8	Close > MA(5)
874	4.10%	2.4	72.20%	MA(5)/MA(10)	5.0	10	Close > MA(3)
1,763	3.24%	3.6	71.75%	MA(5)/MA(20)	10.0	6	Close > MA(5)
318	3.88%	2.3	71.70%	MA(5)/MA(10)	7.5	10	Close > MA(3)
3,673	3.09%	4.0	71.47%	MA(5)/MA(20)	5.0	8	Close > MA(5)
1,558	3.57%	2.3	71.44%	MA(5)/MA(10)	5.0	8	Close > MA(3)
1,502	3.14%	1.6	71.17%	MA(5)/MA(10)	5.0	8	First Up Close
617	4.26%	3.7	71.15%	MA(5)/MA(10)	7.5	8	Close > MA(5)
3,517	2.80%	3.7	71.14%	MA(5)/MA(20)	7.5	6	Close > MA(5)

1,926	3.60%	4.6	71.13%	MA(5)/MA(10)	5.0	8	CRSI > 70
880	3.56%	1.9	71.02%	MA(5)/MA(10)	5.0	10	CRSI > 50
1,035	3.88%	3.8	71.01%	MA(5)/MA(20)	10.0	8	Close > MA(5)
2,792	2.28%	3.4	70.99%	MA(5)/MA(20)	10.0	4	Close > MA(5)
4,792	2.06%	3.5	70.97%	MA(5)/MA(10)	5.0	4	Close > MA(5)
1,572	3.12%	1.8	70.87%	MA(5)/MA(10)	5.0	8	CRSI > 50
1,074	4.16%	4.7	70.86%	MA(5)/MA(10)	5.0	10	CRSI > 70

All 20 of the top variations have historically produced a profit on at least 70% of the identified trades! Notice that there is a good deal of overlap between this list and the one presented in the previous section on Average % P/L. This overlap indicates we have multiple strategy variations that have historically won consistently while producing excellent edges.

Section 4

Selecting Strategy Parameters

In previous chapters we've described the different values tested for strategy parameters such as the moving averages we use, the distance the fast MA falls below the shorter MA, entry limit % and exit method. In this section we'll discuss some additional factors to consider as you decide which variation(s) to use in your trading.

Let's talk conceptually about entries and exits for a moment. Both entry and exit rules can be thought of in terms of how strict they are, i.e. how easy or difficult they are to achieve. You might also say that strictness is a measure of how frequently or infrequently the rule conditions occur. For oscillators such as ConnorsRSI, values that are closer to the extremes (0 and 100) are more strict (less likely to occur) than values in the middle of the range.

Stricter entry rules will be satisfied less frequently than more lenient entry rules, and thus a strategy that relies on the stricter rules will generally generate fewer trades than a strategy whose entry rules are more easily satisfied. With a robust strategy, the reward for fewer trades is usually a higher gain per trade, on average. If you buy a slightly oversold stock, it's most likely to provide a moderate gain. But if you wait for the stock to become extremely oversold, the chances are much higher that it will experience a significant price increase and result in a bigger profit.

In contrast to entry rules, the strictness of exit rules has little effect on the number of trades generated by the strategy. However, just like the entry rules, stricter exit rules typically result in higher average profits. Why? Because stricter exit rules tend to keep you in your trades for a longer time, giving the stock more time to experience the mean reversion behavior that we're attempting to exploit with a strategy like this quantified approach to *Trading Stocks and Options with Moving Averages*. Thus, for entries the tradeoff is between more trades and higher gains per trade, while for exits the tradeoff is between shorter trade durations and higher gains per trade.

* * *

Now let's turn our attention back to the strategy described in this Guidebook. In the table below, we compare four variations of the strategy that all use the same moving average scenario (5 days for the fast MA and 10 days for the slow MA), the same limit entry (6%) and the same exit method (ConnorsRSI > 70). Only the value of the MA Stretch for the entry threshold differs between the variations shown below.

The Effect of MA Stretch Entry Threshold for Quantified MA Strategy

# Trades	Avg % P/L	Avg Days Held	Win %	MA Scenario	MA Stretch	Limit %	Exit Method
10,059	1.98%	4.6	68.76%	MA(5)/MA(10)	2.5	6	CRSI > 70
3,360	2.83%	4.6	70.30%	MA(5)/MA(10)	5.0	6	CRSI > 70
1,106	3.11%	4.7	68.44%	MA(5)/MA(10)	7.5	6	CRSI > 70
407	3.51%	5.0	66.34%	MA(5)/MA(10)	10.0	6	CRSI > 70

Notice that the most lenient entry in the table, the first line with an MA Stretch of 2.5%, generated the most trade signals and the lowest gain per trade. As the entry rule becomes stricter, i.e. the MA Stretch threshold rises, we see fewer and fewer trade signals but higher and higher average gains per trade. The variation with an entry threshold of 10% increases the Average % P/L by about 75% compared to the first variation, but also has less than 1/20th the number of trades.

It should come as no surprise that the pattern emerges again when we hold all parameters constant except the Limit % used to determine the limit entry price. If we keep the Setup conditions constant, then there will obviously be more stocks that experience a pullback of 2% or greater the next day than there will be those that pullback by at least 10%.

Variations with Different Limit % Entries for Quantified MA Strategy

# Trades	Avg % P/L	Avg Days Held	Win %	MA Scenario	MA Stretch	Limit %	Exit Method
8,317	1.34%	4.4	65.88%	MA(5)/MA(10)	5.0	2	CRSI > 70
5,509	1.97%	4.5	67.83%	MA(5)/MA(10)	5.0	4	CRSI > 70
3,360	2.83%	4.6	70.30%	MA(5)/MA(10)	5.0	6	CRSI > 70
1,926	3.60%	4.6	71.13%	MA(5)/MA(10)	5.0	8	CRSI > 70
1,074	4.16%	4.7	70.86%	MA(5)/MA(10)	5.0	10	CRSI > 70

We have confirmed that stricter entry rules result in fewer trades but higher average gains. Now let's look at the exits. Here we hold the Setup and entry criteria constant, but vary the exit methods:

Variations with Different Exit Methods for Quantified MA Strategy

# Trades	Avg % P/L	Avg Days Held	Win %	MA Scenario	MA Stretch	Limit %	Exit Method
420	2.19%	1.9	65.95%	MA(10)/MA(20)	7.5	10	First Up Close
403	2.98%	2.6	68.24%	MA(10)/MA(20)	7.5	10	Close > MA(3)
379	4.48%	4.0	70.18%	MA(10)/MA(20)	7.5	10	Close > MA(5)
430	2.49%	2.0	67.67%	MA(10)/MA(20)	7.5	10	CRSI > 50
525	4.40%	4.5	69.52%	MA(10)/MA(20)	7.5	10	CRSI > 70

All five variations generated a very similar number of trade signals. The range is from 379 trades to 525 trades. However, the variation that uses the most lenient exit method (covering the position on the first day that the stock price closes up) generates an average gain that is about half of the strictest exit methods. We can also see that stricter exits increase the average gain and win rates by comparing the two different MA and ConnorsRSI exits. MA(3) is a less stringent exit requirement than MA(5) and MA(3) is less profitable on average than MA(5) although there are more trades with the less stringent rule. The same is true when using ConnorsRSI to trigger the exit rule.

Armed with this information, you will now be able to select strategy parameters that are most likely to produce the number of trade signals, average gains, and trade duration that best complement your overall trading plan.

Section 5

Using Options

Options trading has been a major growth industry over the past several years in the markets. This is because spreads have tightened, liquidity has increased, and the ability to easily trade complex options has never been simpler.

We'll now focus on applying options trading to the short-term market moves we have just learned. Like everything else in this Guidebook, there are definitive rules as to how to execute an options trade when a strategy signal triggers.

Before we go on, it will be helpful to review a few terms and concepts related to options.

The owner of a **call option** has the right, but not the obligation, to purchase the underlying security (stock or stock) at the **strike price** on or before the **expiration date** of the option contract. The value of a call option generally rises as the price of the underlying security rises. A call option is considered to be **In-The-Money (ITM)** when its strike price is below the price of the underlying security, and **Out-of-The-Money (OTM)** when its strike price is above the price of the underlying security. For example, if the increment between strike prices for SPY options is $1 and the price of SPY is currently $162.35, then the first (closest) ITM call option is the one with a strike price of $162. The first OTM call option is the $163 strike.

The owner of a **put option** has the right, but not the obligation, to sell the underlying security (stock or stock) at the **strike price** on or before the **expiration date**. The value of a put option usually rises as the price of the underlying security falls. A put option is considered to be **In-The-Money (ITM)** when its strike price is above the price of the underlying security, and **Out-of-The-Money (OTM)** when its strike price is below the price of the underlying security. If the price of SPY is currently $166.55, then the first (closest) ITM put option is the $167 strike, and the first OTM put option is the $166 strike.

The strategy described in this guidebook is to buy stocks that are oversold based on quantified moving average rules. To implement that strategy with options, calls would be used. Put options would be used to implement strategies described in other Guidebooks that take short positions.

Most **option contracts** control 100 shares of the underlying stock or stock. However, the price quoted by most trading platforms is the price per share. Therefore, the cost of purchasing the option contract is typically 100 times the per-share price, plus commissions. Thus, if a SPY call option has a quoted price of $1.27, then it will cost you $127.00 plus commissions to purchase the call option contract. Sometimes you will hear the price of an option referred to as the option's **premium**.

All option contracts have an **expiration date**, after which the contract is no longer valid. The three most common types of option expirations are:

- **Weekly**: Contract expires on the last trading day of the week, typically a Friday.
- **Monthly**: Contract expires on the Saturday following the third Friday of the month, which means that the last day for trading the option is the third Friday.
- **Quarterly**: Contract expires on the last trading day of the calendar quarter.

In this Guidebook, we will be focused entirely on option contracts with monthly expirations. The monthly contract with the nearest expiration date is known as the **front month**. For example, if today is June 10th, then the front month contract is the one which expires in the third week of June. The next available expiration (in this case July), is known as the **second month**. The day after June expiration, July would become the front month and August would become the second month.

Strategies in the Guidebook generally follow certain patterns:

1. The majority of the moves from entry to exit have been held a very short period of time (2-12 trading days).

2. The average gains per trade have been large – well beyond the normal distribution of prices over that short period of time.

3. A high percentage of the moves have been directionally correct.

When we look at this type of behavior, it can lead to many strategies but one strategy stands out (and this has been confirmed by professional traders). **The strategy is to buy the front month, in-the-money call option.**

Why front month, in-the-money long options? Because they will move most closely to the stock itself. And the closer an option moves with the stock, the greater the gain will be on a percentage basis when the move is correct.

Here are the rules.

1. A signal triggers.

2. Buy the front month in-the-money call. If you would normally trade 500 shares of the stock buy 5 call contracts (every 100 shares should equal one call option contract).

3. Exit the options when the signal triggers an exit on the stock.

Let's go further:

1. What does in-the-money exactly mean here?

In this case it's defined as one to two strike prices in the money. This will be below the current market price for a call option. If the price of the stock is $48 and the interval between option contracts is $5, then buy a $45 or $40 call.

2. What does front month mean here?

Because the holding period is so short, you want to trade the options whose monthly expiration is the closest. If the closest month is eight trading days or less from the front month's option expiration date (meaning the second Wednesday before or closer) use the following month as the one to trade.

3. What happens if I'm in the position and it expires, yet the signal for the stock is still valid?

In this case, roll to the next month. You're trading the stock signals so you want to have exposure to that signal.

4. What about liquidity and spreads?

There's some discretion here. There is no hard and fast rule as to what exactly liquidity means in options. Many traders look for minimum volume and/or open interest to determine liquidity.

Assuming there is active volume in the options, look at the spreads. If the option is trading $3.00 bid / $3.30 offer, the spread is 10%. Can you really overcome a 10% spread? Not likely. Now compare this to an option that's trading at $3.25 bid / $3.30 offer. This is far more acceptable and tradable.

5. What are the advantages of buying call options instead of the stock?

Assuming the spreads and liquidity are there, the advantages are large:

1. Greater potential ROI on capital invested.
2. Less money tied up.
3. Less points at risk. This means if you buy a stock at $50, the price can theoretically fall to zero and you could lose up $50 a share. The options can only lose up to the premium you paid. So, if you bought the $45 call for $5.50, the risk is only the premium of $5.50.
4. There's greater flexibility. For example, let's say the stock triggered a buy signal at $50 and you paid $5.50 for the $45 calls. If the stock immediately moves up (let's say to $56), you have choices. You can exit, or you can roll into the $55 call getting most of your money out and now turning this into a nearly free trade if you believe that prices will continue to rise.

There are numerous examples like this and you can find these types of strategy opportunities in most options books. But trading anything exotic or different than simply buying ITM calls is against the advice of the many professionals we posed this question to.

In conclusion, options provide traders with a good alternative to owning the stock outright. The structured methodology for our strategies is: front month, in-the-money, with equivalent sizing (1 option per 100 shares), and exiting when the stock signals an exit.

The above options strategy, in many experts' opinion, is the best and most efficient strategy based upon the historical data from these signals.

Section 6

Additional Thoughts

1. As you have seen throughout this Guidebook, the *Quantified Moving Average Strategy* has had large quantified edges when applied in a systematic manner.

2. There are literally hundreds of potential variations for you to use. By adjusting the input variables described in the rules, you can customize how the strategy will perform for you. Want more trades? Look at variations with faster moving averages or smaller MA stretch values for the entry rules. Bigger average returns? Check out the variations that have the strictest entry criteria (high MA Stretch values and high Limit % entry rules) and longest durations (ConnorsRSI 70 exit method). Want to get in and out of trades more quickly to reduce overnight risk and free up your capital for other trades? Try the variations that utilize the First Up Close exit method.

3. What about stops (and we include the answer to this in all our Strategy Guidebooks)?

We have published research on stops in other publications including in our book ***Short Term Trading Strategies That Work.***

What we have found is that stops tend to lessen performance and in many cases they completely remove edges. Yes, it feels good when a stock keeps moving lower and lower and a stop got you out. On the other side, the research which is backed by up to two decades of test results on many short-term trading strategies suggests that stops get hit often and accumulate many, many losses. Few trading strategies can overcome these aggregated losses.

For many traders stops are a must. Psychologically it allows them to take trades, especially difficult trades. Whether you use them or not is a personal choice. On the whole though, the edges you see in this strategy and many other short-term strategies are lower when stops are applied to them. Again this is a personal choice only you can make for yourself. We know successful traders in both camps.

4. Slippage and commission were not used in the testing. Factor them into your trading (the entries are at limit prices so slippage is not an issue) and make sure you're trading at the lowest possible costs. Most firms are now allowing traders to trade for under 1 cent a share, so shop your business, especially if you are an active trader. The online brokerage firms want your business.

We hope you enjoyed this addition to the **Connors Research Trading Strategy Series**. If you have any questions about this strategy please feel free to email us at info@connorsresearch.com

Appendix:

The ConnorsRSI Indicator and Historical Volatility

ConnorsRSI

Larry Connors and Connors Research have been developing, testing, and publishing quantified trading strategies since the mid-1990's. During that time, we have had the opportunity to evaluate a great number of different technical indicators and to assess their effectiveness in predicting future price action. Now we've taken the next step and created an indicator of our own: ConnorsRSI. In this chapter we will describe the indicator and provide details on its calculation.

ConnorsRSI is a composite indicator consisting of three components. Two of the three components utilize the Relative Strength Index (RSI) calculations developed by Welles Wilder in the 1970's, and the third component ranks the most recent price change on a scale of 0 to 100. Taken together, these three factors form a *momentum oscillator*, i.e. an indicator that fluctuates between 0 and 100 to indicate the level to which a security is overbought (high values) or oversold (low values).

Before we discuss how to calculate ConnorsRSI, let's review Wilder's RSI. RSI is a very useful and popular momentum oscillator that compares the magnitude of a stock's gains to the magnitude of its losses over some look-back period. Wilder himself believed that 14 periods was the ideal look-back. We often use the shorthand notation RSI(14) for the 14-period RSI. The formula below computes RSI(14) for a series of price changes:

$$RSI = 100 - \frac{100}{1 + RS}$$

RS = Average Gain / Average Loss

Average Gain = [(previous Average Gain) x 13 + current Gain] / 14
First Average Gain = Total of Gains during past 14 periods / 14

Average Loss = [(previous Average Loss) x 13 + current Loss] / 14
First Average Loss = Total of Losses during past 14 periods / 14

Note: "Losses" are noted as positive values.

RS = Average of x days up closes / Average of x days down closes

If we wanted to compute RSI for a different number of periods (N), then we would replace 14 in the formula above with N, and replace 13 with N-1. Regardless of the number of periods used in the calculation, the result will always be a number between 0 and 100. Traders who use RSI(14) typically look for values greater than 70 to identify overbought conditions, and values less than 30 to indicate oversold conditions.

Our previous research has shown that using shorter look-back periods makes RSI more effective in predicting short-term price movements. We have published many strategies that utilize RSI(2), as well as

several that use RSI(3) and RSI(4). Changing the number of periods also has an effect on the RSI levels that best identify overbought and oversold conditions. For example, an RSI(2) value of less than 10 is usually a reliable indicator of an oversold condition, while an RSI(2) value over 90 is a good benchmark for an overbought condition.

Now let's turn our attention back to ConnorsRSI. As mentioned previously, ConnorsRSI combines three components, and as you might guess, they are all elements that our research has repeatedly shown to have significant predictive ability:

Price Momentum: As we just discussed, RSI is an excellent way to measure price momentum, i.e. overbought and oversold conditions. By default, ConnorsRSI applies a 3-period RSI calculation to the daily closing prices of a security. We will refer to this value as RSI(Close,3).

Duration of Up/Down Trend: When the closing price of a security is lower today than it was yesterday, we say that it has "closed down". If yesterday's closing price was lower than the previous day's close, then we have a "streak" of two down close days. Our research has shown that the longer the duration of a down streak, the more the stock price is likely to bounce when it reverts to the mean. Likewise, longer duration up streaks result in larger moves down when the stock mean reverts. In effect, the streak duration is another type of overbought/oversold indicator.

The problem is, the number of days in a streak is theoretically unbounded, though we could probably place some practical limits on it based on past experience. For example, we might observe that there have been very few instances of either an up streak or a down streak lasting for more than 20 days, but that still doesn't get us to a typical oscillator-type value that varies between 0 and 100.

The solution is two-fold. First, when we count the number of days in a streak, we will use positive numbers for an up streak, and negative numbers for a down streak. A quick example will help to illustrate this:

Day	Closing Price	Streak Duration
1	$20.00	
2	$20.50	1
3	$20.75	2
4	$19.75	-1
5	$19.50	-2
6	$19.35	-3
7	$19.35	0
8	$19.40	1

The closing price on Day 2 is higher than on Day 1, so we have a one-day up streak. On Day 3, the price closes higher again, so we have a two-day up streak, i.e. the Streak Duration value is 2. On Day 4, the closing price falls, giving us a one-day down streak. The Streak Duration value is

negative (-1) because the price movement is down, not up. The downward trend continues on Days 5 and 6, which our Streak Duration reflects with values of -2 and -3. On Day 7 the closing price is unchanged, so the Streak Duration is set to 0 indicating neither an up close nor a down close. Finally, on Day 8 the closing price rises again, bringing the Streak Duration back to 1.

The second aspect of the solution is to apply the RSI calculation to the set of Streak Duration values. By default, ConnorsRSI uses a 2-period RSI for this part of the calculation, which we denote as RSI(Streak,2). The result is that the longer an up streak continues, the closer the RSI(Streak,2) value will be to 100. Conversely, the longer that a down streak continues, the closer the RSI(Streak,2) value will be to 0. Thus, we now have two components -- RSI(Close,3) and RSI(Streak,2) -- that both use the same 0-100 scale to provide a perspective on the overbought/oversold status of the security we're evaluating.

Relative Magnitude of Price Change: The final component of ConnorsRSI looks at the size of today's price change in relation to previous price changes. We do this by using a Percent Rank calculation, which may also be referred to as a "percentile". Basically, the Percent Rank value tells us the percentage of values in the look-back period that are less than the current value.

For this calculation, we measure price change not in dollars and cents, but as a percentage of the previous day's price. This percentage gain or loss is typically referred to as the one-day return. So if yesterday's closing price was $80.00, and today's price is $81.60, the one-day return is ($81.60 - $80.00) / $80.00 = 0.02 = 2.0%.

To determine the Percent Rank, we need to establish a look-back period. The Percent Rank value is then the number of values in the look-back period that are less than the current value, divided by the total number of values. For example, if the look-back period is 20 days, then we would compare today's 2.0% return to the one-day returns from each of the previous 20 days. Let's assume that three of those values are less than 2.0%. We would calculate Percent Rank as:

Percent Rank = 3 / 20 = 0.15 = 15%

The default Percent Rank look-back period used for ConnorsRSI is 100, or PercentRank(100). We are comparing today's return to the previous 100 returns, or about 5 months of price history. To reiterate, large positive returns will have a Percent Rank closer to 100. Large negative returns will have a Percent Rank closer to 0.

The final ConnorsRSI calculation simply determines the average of the three component values. Thus, using the default input parameters would give us the equation:

ConnorsRSI(3,2,100) = [RSI(Close,3) + RSI(Streak,2) + PercentRank(100)] / 3

The result is a very robust indicator that is more effective than any of the three components used individually, and in most cases, also more effective than combining the three components independently.

Historical Volatility

The historical volatility is defined as the standard deviation of the logarithmic price changes measured at regular intervals of time. Since settlement prices are usually considered the most reliable, the most common method of computing volatility involves using settlement-to settlement price changes. We defined each price change, x_i, as:

$$x_i = \ln (P_i / P_{i-1})$$

where P_i is the price of the underlying contract at the end of the i^{th} time interval.

P_i/P_{i-1} is sometimes referred to as the price relative.

Week	*Underlying Price*	$ln(P_i/P_{i-1})$	*Mean*	*Deviation from Mean*	*Deviation Squared*
0	101.35				
1	102.26	+.008939		.007771	.000060
2	99.07	–.031692		–.032859	.001080
3	100.39	+.013236		.012069	.000146
4	100.76	+.003679		.002512	.000006
5	103.59	+.027699	+.001167	.026532	.000704
6	99.26	–.042698		–.043865	.001924
7	98.28	–.009922		–.011089	.000123
8	99.98	+.017150		.015982	.000255
9	103.78	+.037303		.036136	.001306
10	102.54	–.012020		–.013188	.000174
		+.011674			.005778

We first calculate the standard deviation of the logarithmic price changes:

standard deviation $= \sqrt{(0.05778/9)}$

$= \sqrt{(0.000642)}$

$= .025338$

We then calculate the annual volatility by multiplying the standard deviation by the square root of the time interval between price changes. Since we looked at price changes every week, the time interval is 365/7:

annualized volatility $= .025338 \times \sqrt{(365/7)}$

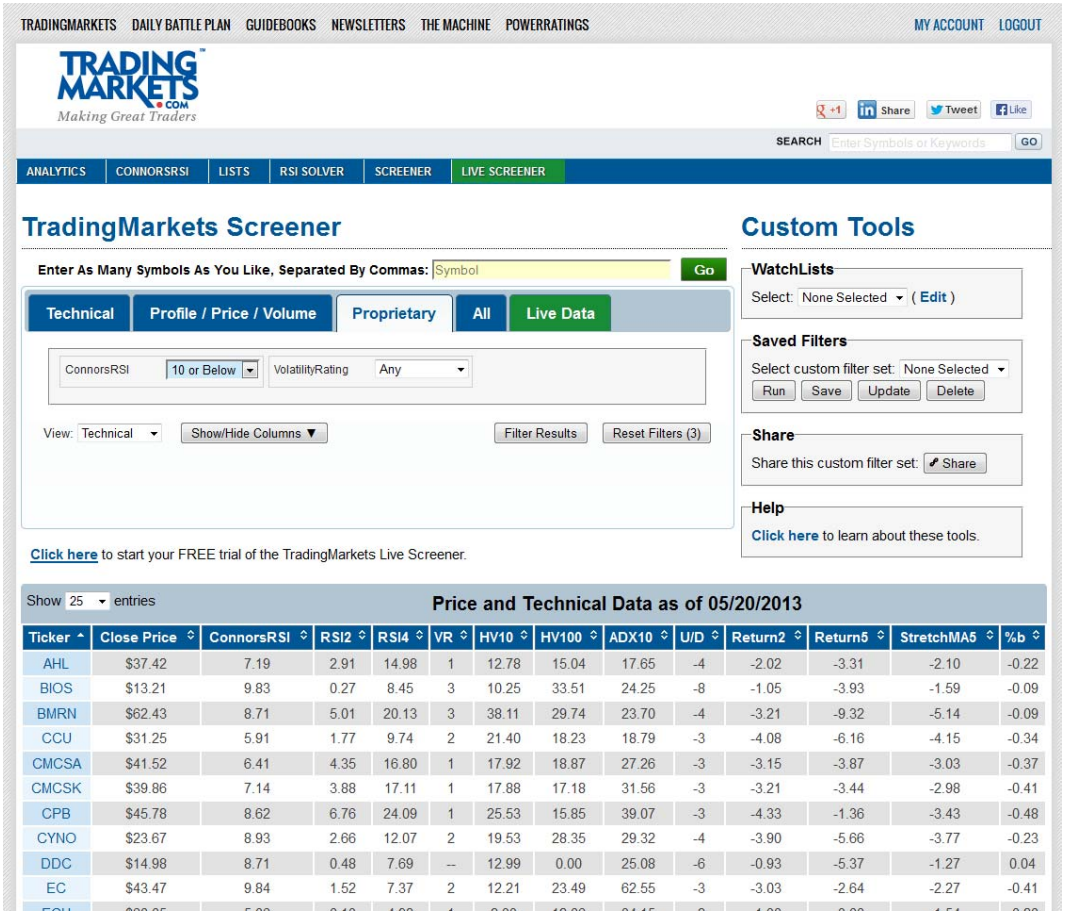
$$= .025338 \times \sqrt{52.14}$$

$$= .025338 \times 7.22$$

$$= .1829 \ (18.29\%)$$

Reprinted from: Nathanberg, Sheldon. Option Volatility & Pricing, Advanced Trading Strategies and Techniques, 2d ed., (Chicago: Probus Publishing, 1994), Appendix B.

Receive ConnorsRSI Readings for Free from the TradingMarkets Screener



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Price and Technical Data as of 05/20/2013

Ticker	Close Price	ConnorsRSI	RSI2	RSI4	VR	HV10	HV100	ADX10	U/D	Return2	Return5	StretchMA5	%b
AHL	$37.42	7.19	2.91	14.98	1	12.78	15.04	17.65	-4	-2.02	-3.31	-2.10	-0.22
BIOS	$13.21	9.83	0.27	8.45	3	10.25	33.51	24.25	-8	-1.05	-3.93	-1.59	-0.09
BMRN	$62.43	8.71	5.01	20.13	3	38.11	29.74	23.70	-4	-3.21	-9.32	-5.14	-0.09
CCU	$31.25	5.91	1.77	9.74	2	21.40	18.23	18.79	-3	-4.08	-6.16	-4.15	-0.34
CMCSA	$41.52	6.41	4.35	16.80	1	17.92	18.87	27.26	-3	-3.15	-3.87	-3.03	-0.37
CMCSK	$39.86	7.14	3.88	17.11	1	17.88	17.18	31.56	-3	-3.21	-3.44	-2.98	-0.41
CPB	$45.78	8.62	6.76	24.09	1	25.53	15.85	39.07	-3	-4.33	-1.36	-3.43	-0.48
CYNO	$23.67	8.93	2.66	12.07	2	19.53	28.35	29.32	-4	-3.90	-5.66	-3.77	-0.23
DDC	$14.98	8.71	0.48	7.69	--	12.99	0.00	25.08	-6	-0.93	-5.37	-1.27	0.04
EC	$43.47	9.84	1.52	7.37	2	12.21	23.49	62.55	-3	-3.03	-2.64	-2.27	-0.41