

To Stop or Not to Stop— Setting Stops for Maximum Profit

By Sunny J Harris

Introduction

As novices, we are all told to set stops. Possibly that's a "CYA" for brokers and professional advice givers. If they don't tell you to set stops, they could be liable if you lose lots of money. Setting stops is probably a good idea, in case you go to the bathroom and the market crashes. Another good reason for setting stops is to keep you honest, and not holding onto a losing trade (and then becoming a long-term investor.)

There are lots of suggestions on where and how to set them: at your maximum pain level, at 2% of your investment (depending on your account size), below the recent highs or lows at Fibonacci levels, use the SAR Parabolic, use ATR exits, and on it goes.

In this article I want to look at the S&P eMini, since it has so much historical data and it's a proxy for stocks that have a high beta with the stock market in general, which is most of them. But, before testing stops, we must find a strategy that works.

Definitions and Setup

In order to facilitate my testing of all kinds of moving averages I programmed both an indicator and a strategy that have inputs to allow optimization to find the best fit for all kinds of averages, MACD and my own Dynamic Moving Average. It makes life simpler than putting a new moving average and a new strategy on each chart seven times. It's all in one place. Simply, I call it **sjh_AllAverages¹**.

Further, I am using the same chart for every example in this article—the continuous contract of the eMini S&P 500 (@ES), over a 5-year timespan, from 5/11/15 to 5/11/20. And, I am not allowing for slippage or commission.

We will start with a chart of a simple moving average (SMAV) with no signals and no stops. We will work up from there, by adding signals one at a time and testing different stop schemes on the chart, one at a time. Of course, I have programmed a strategy I call **sjh_Exits** that has all the exit strategies (stop loss and profit targets) I could think of in one place, again so I can easily optimize them to see what works best.

Lastly, each of these strategies is a reversal system, with buys (longs) begetting sells (shorts) and sells begetting buys. I leave it to the reader to try the same set of experiments from the long side only, in case you are an investor and not a trader.

¹ As a convention, I put my initials and an underscore in the beginning of any routine name. That way all the studies I write live in one place and are easy to find.

Simple Moving Averages

The first example looks at a simple moving average (SMAV), using the standard 50-day and 200-day moving averages to generate crossover trades. These are the numbers we see in the literature from buy-and-hold brokers and which emanated from Dow Theory. When the moving averages cross upward we buy and when the SMAVs cross downward we sell.

The first chart does not have any signals on it, so you can just take a look at the breadth of the inputs. 50-200 means basically that we are averaging over the last year. If you eliminate holidays and weekends and give yourself 2 weeks off for vacation, that's about 240 trading days per year. Why they originally started with 50 and 200 in Dow Theory, I don't know. But that's where we are starting.



FIGURE 1—S&P eMini with SMAV 50-200, 5 years ending 20200511

I chose not to show the entire 5 years in the figure above so as not to squish everything together. It wouldn't be very readable that way. So, what you see above is the final 2 years or so. But the tests include the entire 5 years.

Well, that doesn't look so successful. It was long all the way through the CoronaVirus-19 Collapse before the moving averages signaled to either to get out of the market or to go short. Maybe if we are talking about your pension plan, or 501-K, that's a good way to look at it. But for traders? Not so much.

Now let's take a look at the series and the signals from the averages. See Figure 2 below.



Figure 2—Simple MAVs, 50 & 200 crossover with signals

It doesn't look like much in this configuration, because the crossover technique totally missed the Covid-19 Collapse. It went short about 25% up from the bottom of the crash, leaving us short while the market was again rising and it didn't short the crash. However, inspection of the Performance Report shows a different story. The profit on one contract of the S&P eMini is \$21,000 in 3 trades over 5 years, with an average trade profit of \$7,000. The Profit Factor (PF) was 2.11, the Percent Profitable (%P) was 33.33% and the Ratio Avg Win: Avg Loss (Ratio) was 4.21. Thus, the CPC Index² was 2.93. However, the Open Position P/L was (\$14,412.50), cutting deeply into the \$21,000 profit. As you can see, it typically holds trades for a very long time, following the trend. That speaks to the buy-and-hold philosophy.

We could try two things to remedy the scary scenario of having to sit through a crash. First, we could try using price crossing the moving average instead of using crossovers of the moving averages themselves. Second, we could try using the 50-day MAV as a stop. Let's see what happens.

This next figure shows the picture of using price crossing over the moving average itself as a signal. It's not very pretty.

² My CPC Index™ is calculated by multiplying together the Profit Factor, the Percent Profitable and the Ratio Avg Win: Avg Loss. In my research I have found that for a strategy to be successful the CPC Index needs to be 1.2 or greater.

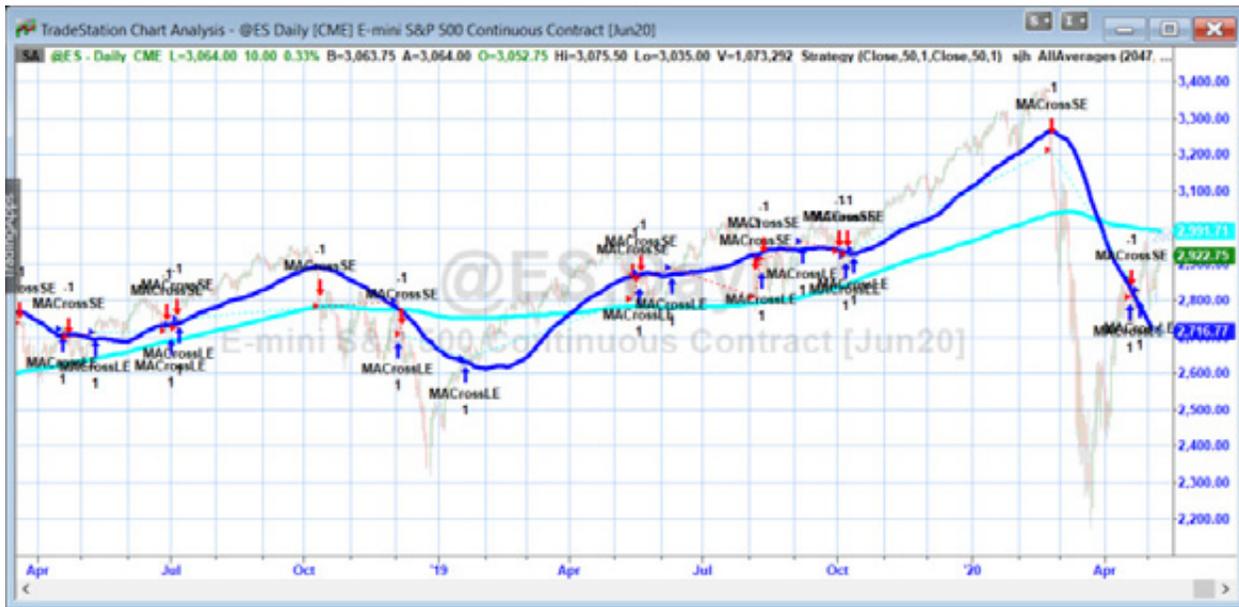


Figure 3—Price crossing the 50-day moving average

The profit/loss picture is even worse, with the Performance Report showing a loss of (\$10,087.50) in 67 trades. However, look at the place that this strategy got short in the Covid-19 Collapse. Pretty nice. That might speak to trying out the 50-day average as a stop in a different entry strategy. We will try that technique next.

Now let's look at using the SMAV crossovers from Figure 2 and placing a stop at the 50-day SMAV. Our first effort will be from the long side only, using the 50-day SMAV for stops. A brief aside. Before getting to the stop placement, we need to know the P/L of the long-only strategy. If we eliminate the shorts and exit the long positions at the place where the strategy was previously a short, the P/L is \$28,175.00 in 2 trades, with a CPC Index of 5.71. There is no open position left over, since we were not taking short trades.

Now that I think of it, it would be a good idea to know what the Buy and Hold P/L would be, starting at the beginning of the 5-year period and closing at the end of the chart. On 5/11/2015 the price was 2,100. At the end of the chart, on 5/11/2020 the price was 2,922.75. The difference is 822.75. The eMini is \$50 per point, so the profit is \$41,137.50. Good baseline to know.

Assuming we are taking long positions only and exiting when price crosses over the 50-day SMAV, and re-entering when price crosses back above the SMAV, we get P/L of \$17,825.00 with an Open Position P/L of \$4,687.50, which brings the net profit up to \$22,512.50. The CPC Index of this strategy is 1.53.

The chart of this technique is in Figure 4. As you can see, using the 50-day SMAV as an exit kept us out of the Covid-19 Collapse, but did not get us back in until the recovery was more than halfway back up.

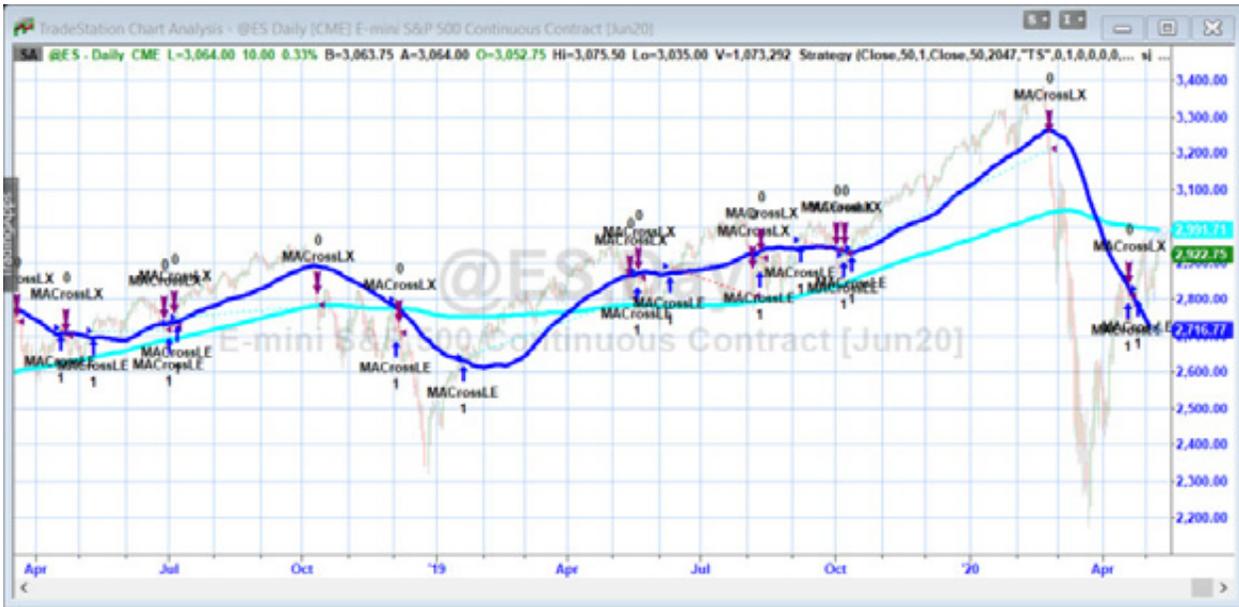


FIGURE 4—Price crossing the SMAV

Exponential Moving Averages

Let's try for some more sophisticated entries from which to exit. It makes sense to get a better return to start with before we look too hard for stops and exits.

Many people espouse the exponential moving average (XMAV) because it is faster to make turns with market changes. If we go back to our original 50-day and 200-day moving averages and this time use the Exponential Moving Averages, we get the picture in Figure 5.



FIGURE 5—Dual Exponential (XMAV) crossovers (50, 200)

You can see that the entries and reversals are faster but can also see that we exited the

Covid-19 Collapse and went short near the very bottom. Price crossing over moving averages (versus the moving averages crossing themselves) seen in Figure 3 clearly was not a good choice, so we are not going to try that again.

As for profit and loss, the exponential moving averages do not fare better than the simple moving average, at least at this length. The Total Net Profit is only \$10,400 with an open position of (\$26,012.50). That leaves us with a net profit of (\$15,612.50). If we ignore the open position and just look at the statistics from the \$10,400, we have a CPC Index of 1.40.

Just for grins, let's put the default values of 9 and 18 in the XMAV and see what we get. I am interested, just for comparison. With this we get a P/L of \$4,375, an open trade of \$5,587.50, in 54 trades with an average trade of \$81.02. The CPC Index is 0.78. Not tradable in my mind. Not only does the CPC Index not pass muster, the average trade should be at least \$100 for a successful system.

We can see from Figure 5 that using price crossing over the 50-day moving average will again cause lots of whipsaws (see "The Horrors of Whipsaws" from Traders World Issue #76). Price crosses over the average too many times. But what if we use the 200-day XMAV for a stop?

It doesn't look good on a chart, with many crosses back forth, but the profit picture looks good. The total net profit is \$43,300 with a PF of 4.40, an open trade of \$0, the Ratio is 2.80 and it is profitable 61.11% of the time. The average trade is \$2,405.56. The CPC Index comes to an amazing 7.52.

Let's try one more type of moving average, the MACD, before we move on to trying several different types of stops. We are trying to find the most profitable entries and exits before settling in on profit and loss stops.

MACD—Moving Average Convergence-Divergence

Originated by Gerald Appel in 1979, the MACD looks like a moving average, but is actually an oscillator. It is composed of two XMAVs and a line which is the difference between the two XMAVs. The default input values are 12, 26, and 9. Thus the first two XMAVs are at 12 and 26, and the difference between them is averaged at a period of 9. In Figure 6 you can see what the default MACD chart looks like.



FIGURE 6—Default MACD indicator

Typically the MACD lines and the difference, presented as a histogram, are plotted together. I like to change the picture to look more like a moving average and use the crossovers of the MACD as a strategy. Since the background of my chart is white, I make the histogram white and then it virtually disappears, and then I raise the indicator up to the first plot area and overlay it on price. I also change the color of the lines and make them thicker. Further, in order for the lines to show up on a chart scaled in the 2,000s I have to introduce a new axis and scale it on the left. (If you have any questions about this, call me at 760-908-3070). In Figure 7 you can see what I prefer to see. I think it is much easier to see the crossing of the indicator and its correlation to price action.



FIGURE 7—MACD overlaid on chart of S&P eMini

You can readily see that there are lots of crossovers in this figure. And when I apply the MACD

strategy to the chart, indeed there are lots of signals. See Figure 8.



FIGURE 8—MACD Strategy

Referring back to my comments about moving averages not catching the Covid-19 Collapse, take a look at Figure 8. You can see that this MACD strategy, with the default inputs (no optimization) caught the drop by going short and went long not too far after the bounce back. Taking a look at the Performance Report, we find that the net profit is \$44,112.50 with an open trade of \$14,750. That brings the net-net profit to a whopping \$58,862.50, more than anything we have tried so far. The PF is 1.46, the Ratio is 2.92 and the %P is 32.93%. Thus, the CPC Index comes to 1.4. It is a bit low, but it qualifies since it is above 1.2. There were 82 trades and the average trade is \$537.96. That's definitely above my threshold of \$100.

Optimizing the inputs would likely improve the outcomes. I have found over the years that moving averages and oscillators perform better if the input values are fairly close together. I could have tried 50 and 60 in the SMAV setup, rather than 50 and 200, for example. It might have performed better. Optimization of the MACD strategy yields inputs of 11, 13 and 12. The statistics look promising with the P/L at \$88,025 with an open trade of (\$4,787.50) and thus a net-net profit of \$83,237.50. Higher than anything else so far. The PF is 2.13, the %P is 44.58%, and the Ratio is 2.59, with 83 trades and a per trade average profit of \$1,060.54. Calculation shows the CPC Index to be 2.46. Even with all the whipsaws this looks rather good. The question comes back to "can we improve the performance with properly placed stops?" After all, isn't that the point of this article? So, let's get down to applying a variety of stops and profit targets, now that we have a profitable system. For this exercise I will again use my sjh_Exits strategy added to the MACD strategy to facilitate trying various exits.

Sunny's DMA (Dynamic Moving Average)

Finishing off the investigation of strategies, I'll show you one of the things I use in my trading. It's called my Dynamic Moving Average (sjh_DMA). It is an unusual approach to moving

averages as it self-adjusts according to the velocity of the market. That is, most moving averages have static inputs like 9 and 18, but mine changes the length of the average with every bar, depending on how the market is moving. The DMA stays out of the way of choppy, whipsaw markets and follows the trend. While other moving averages cross over and over each other causing the whipsaw, mine tends to widen during choppy markets and avoids the whipsaw.

I can't tell you exactly how it works since it is proprietary, and it already includes profit taking stops, but here are the results. The P/L for the same time period is \$114,625 with no outstanding trade; the PF is 236.13, the total number of trades is 215 with an average trade of \$533.14; the %P is 98.14 and the Ratio is 2.24. With these statistics, the CPC Index comes to 519. The efficiency is 84.58%. Kind of astounding. It's a good measuring stick for anything you develop.

Exit Strategies and Profit Targets

Simple Moving Average Stops

Starting where we left off with the MACD strategy, using a SMAV of length 50 as a stop (in case of catastrophe) and the MACD inputs left at 11, 13, 12 we immediately improve the profits to \$99,662.50 with an open trade of (\$4,787.50), leaving us a net-net profit of \$94,875. That's approximately \$10,000 better than our highest so far. On to more stops and targets. Next, after optimizing the SMAV length for stop setting, we find that an SMAV of length 30 does even better. With this we find the P/L at \$112,137.50 with the same open trade of (\$4,787.50), making the net-net profit \$107,350. The PF is 3.02, the %P is 49.4% and the Ratio is 3.02, with 83 trades and an average trade of \$1,351.05. The CPC Index comes out to 4.50. Now we are really getting some good results.

Profit Targets

Let's now take off the SMAV exits and try some other exit schemes. Optimizing a Profit Target from \$0 to \$2,000 shows that the \$0 is the best; so, no profit target improves the outcome. Next, I'm going to optimize the Stop Loss amount from the same \$0 to \$2,000. The outcome for this experiment shows that again, no stop loss amount improves the outcome of the \$112,137.50 we already had.

Dollar Trailing Amount

Next, trying the Dollar Trailing Amount (rather like putting a Parabolic SAR on the chart) and optimizing from \$0 to \$2,000 in steps of \$12.50 (the tick size of the eMini) again shows no improvement at all. The best amount is \$0.

Percent Trailing Percent

Same story progressively with the Percent Trailing Percent and the Standard Deviation exit. I think I read somewhere, maybe in one of Larry Williams' books, that it improved results to exit on the open of the next day. When trying this one it reduced the profits to \$39,275, with the

same losing open trade and reduced the average trade to \$473.19.

Next Profitable Open

I know it was in one of Larry's books that his idea was to close out on the next profitable open, so this is my next attempt. In this scheme he lets the trade have some time to run a little bit in case it doesn't start right out being profitable. Thus, as soon as the trade becomes profitable, he takes the profit. This attempt brings the P/L down to \$45,912.50 with no open trade, and an average trade of \$546.58. The chart looks like a big mess, and it is shown in Figure 9, just so you can see what I'm talking about. But, if you are a timid trader and want to take your profits as soon as you see them, then this is still a good strategy.



FIGURE 9—MACD with stop set to Next Profitable Open

ADX (trend change) Exits

Using the ADX as a proxy for change in trend (from trending to not trending) we can exit the trade when the trend begins to fail. Optimizing for the length of the ADX and the number of bars to look back to measure the trend, we find that values of 9 and 14, respectively, yield a P/L of \$62,362.50, with no outstanding trade and an average trade of \$742.41. Again, the chart looks really messy, but there might be something to this strategy on a shorter-term chart. (I'm not going to run those experiments here; I've already gone over my page limit in this article.)

Parabolic SAR Exits

The last effort in our research (for this article) is to remove the SMAV exits and the MACD strategy and incorporate Parabolic Stop and Reverse (PSAR) entries and exits. Developed by Welles Wilder in the late 1970s and published in "New Concepts in Technical Trading Systems," the PSAR is a series of dots or crosses under the long trade and above the short trades, that starts at some distance from the entry and gets closer and closer to price as the trade develops (calculated using an acceleration factor) until it gets hit when price goes against the trend and the strategy reverses. See Figure 10.



FIGURE 10—Parabolic SAR

Notice how the dots in Figure 10 get closer and closer to the price bars as the trade develops. We will now run tests to see if the PSAR can exceed the MACD strategy’s profit, which was the highest P/L.

With the standard PSAR as a system for entries and exits, and the default inputs of 0.02 for the step and 0.2 for the limit we get a P/L of \$42,937.50 with no open trade and a total of 105 trades. The PF is 1.35, the %P is 35.24% and the Ratio is 2.48. The average trade is \$408.93. With these statistics, the CPC Index comes to 1.18. According to my rules even though the profit looks good, I wouldn’t trade the strategy because it is not ≥ 1.2 .

I am reluctant to optimize the PSAR because Welles Wilder was clear about the values to use. Nevertheless, let’s give it a shot, not straying very far from the original values. The outcome is just slightly away from the original inputs, but the P/L was markedly improved, with a value of \$68,137.50 and an open trade of (\$837.50). The statistics bring the CPC Index on this test to 1.72.

Switching gears and using the MACD strategy for entries and exits, with the PSAR only as a protective stop, we get a P/L of \$53,912.50 in 83 trades, with no open trade. The PF is 1.8, the %P is 40.96 and the Ratio is 2.6. This gives a CPC Index of 1.92. The average trade was \$649.55.

While the P/L for this strategy was not as high as the MACD strategy above, it is still quite good.

Conclusion

As with Occam's Razor, it would seem that the simplest stop-loss strategy works best: exit a trade when price crosses Simple Moving Average against the trade. The other strategy/stop loss that works well is the PSAR with the MACD crossings as the entries.

I would never recommend to anyone to trade without a stop in place. You never know when the market is going to take a sharp dive or breakout to the upside and you'd be caught in the sweep.

In this research article we have found several options that work quite well. You might consider adopting one for your own use.

If you have any comments or suggestions, don't hesitate to call me at (760) 908-3070 PST or email me at sunny@moneymentor.com.