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The Profitable Journey

Optimizing Your Strategies

When you come up with a new trading idea, you can develop it into a strategy. Then you backtest it and try to optimize it for the best variables and parameters. How do you go about doing that, and how do you get the best financial outcome from this process? Here, we'll cover how to optimize a strategy and how to evaluate the potential profitability of it.

by Sunny J. Harris

AS a consultant, I have often been asked to optimize clients' indicators for the "best fit." Let's say, for simplicity, that the indicator is a simple moving average (SMA). When asking for an optimization of an indicator, the client really wants the best financial outcome, not the best average to fit the data. Initially, they don't know to ask for what they really want. Most beginners need to first acquire some of the language we use as seasoned traders and coding veterans.

The true, mathematical best fit for the data would be a linear regression curve fit (LRCF), which is not necessarily the best profit potential. It becomes a question of whether you want the best mathematical equation that would approximate the data, or the best profit potential.

In Figure 1 you see a chart with the SMA in teal and LRCF in red. Note the differences between the two curves. First, the teal SMA is smoother than the LRCF, and it doesn't really hug the data, but rather approximates the data loosely. The LRCF is the mathematical best fit to the data itself and it hugs the data bars closely. How do you trade such a fit?

There is one more concept to examine before moving on to the real question, which is how to make money. This concept is called a linear regression line (LRL). You can instruct the software to look back a predetermined number of bars and draw the straight line that best fits the data. The fewer data points you give the software, the more recent the data you examine. In the chart in Figure 2, the LRL (straight yellow line) is based on the last 300 bars of data. If you went back a fewer number of bars, the yellow line would only be over that many bars. If you held a ruler to the chart in Figure 2 and "eye-balled" the data, you could probably generate such a line for yourself, just by approximation.

To determine whether you can make money trading from any of these concepts, you would need to write code to test the profitability. Fortunately, software these days allows you to code such concepts in their proprietary languages.

Say you want to use the LRL with 30 data points as a

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beginning. You would first need to state your rules before you could program them. Before moving on to the rules, let's see what "best fit" means. I am guessing you want what gives you the most money, but know that *indicators* do not give trading signals and thus do not produce profits and losses. It's the *strategies* that give trading signals. And a strategy is a set of rules—a recipe that precisely states the buy & sell rules. So if you want to optimize a moving average, then you have to ask another set of questions. You have to come up with the rules for trading the moving average.

TRADESTATION

FIGURE 1: SIMPLE MOVING AVERAGE (SMA) VS. LINEAR REGRESSION CURVE FIT (LRCF). The SMA (teal) is smoother than the LRCF. In other words, LRCF is a better fit mathematically, since it hugs the data bars closely.

A LOOK AT TRADING RULES

Let's examine trading rules next. An indicator is a curve, line, or set of dots that are drawn on a chart of your symbol. I'm going to use the S&P emini for the examples in the remainder of this article for several reasons. The continuous contract of the emini is written "@ES" in my trading programs. So for the futures contract that expired in September 2015, that would be ESU15.

Since I live in the Pacific time (PT) zone, the general session of the markets opens at 6:30 am PT and closes at 13:15 pm. Because I like to trade fast, and look at charts equally fast, I created a couple of indicators so I don't get confused about what time is reflected on my chart; I don't really want to trade until the markets open for the regular session. The first indicator colors the bars on the chart different colors so I can easily see if I am looking at the regular session or the night session.

FIGURE 2: LINEAR REGRESSION LINE ON 300 DATA POINTS. It's pretty easy to "eye-ball" the data. If you held a ruler to the chart you could probably come up with a similar line.

In the chart in Figure 3 you can see my DaySessions indicator. Notice that the candles prior to 6:30 am are colored cyan and magenta, while the candles beginning at 6:30 am are blue and red. Now I can glance at the chart and immediately know whether the bars are in the day session or the night session. I like to keep life simple.

FIGURE 3: DAYSESSIONS INDICATOR. The candlestick bars prior to 6:30 am are colored cyan and magenta, while those starting at 6:30 are colored blue and red. This helps to immediately identify the trading session.

Another indicator I often use to keep life simple is one I call DayDividers. In Figure 4 you'll see vertical colored lines separating the day and night sessions. The cyan vertical line

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ends the night session and shows the beginning of the day session. The magenta vertical line delineates the end of the day session and the beginning of the night session. Indicators such as these make my trading life easier.

Now that I have set the stage, let's get back to the difference between indicators and strategies. In the code I will develop later in this article, I will use the concept of day and night sessions, so hang on to the images.

FIGURE 4: DAYDIVIDERS INDICATOR. Vertical colored lines separate day and night sessions. The cyan vertical line ends the night session and shows the beginning of the day session. The magenta vertical line shows the end of the day session and beginning of night session.

INPUT VALUES

Most indicators have *input values*, which are values sent to the software and can be modified and used for calculations internally. As an example, if you were using the single-line SMA, there are three input values—price, length, and displace. The relevant value is length, which I will set to 9. The other two values (price and displace) can be ignored for now. They have more sophisticated uses that I will not address in this article.

If you change the input value of *length*, the chart will look different. For example, in the chart in Figure 5 the input value for length is 15, while the chart in Figure 6 has an input value for *length* of 5. Take a look at the differences between the two charts. The chart in Figure 5 is slower (that is, it's slower to make changes in direction) than the chart in Figure 6. The curve in Figure 5 is smoother.

FIGURE 5: CHART WITH SMA WITH INPUT VALUE OF LENGTH AT 15. This curve is relatively smooth, meaning that it is probably slower to make changes in price direction.

Again, recall that an indicator does not make money; it's the strategy that makes money. The strategy contains buy & sell commands, while an indicator is merely overlaid on a chart. So how do you use a strategy to buy and sell?

In order to create a strategy, we need to specify three things:

- When to buy or sell
- When to take profits if you are right
- When to take your loss if you are wrong.

FIGURE 6: CHART WITH SMA WITH INPUT VALUE OF LENGTH AT 5. When using a shorter length, the SMA is more responsive to price moves. You'll see that it hugs the price bars closely.

For this exercise I will use the EasyLanguage/PowerLanguage editors' commands from TradeStation/MultiCharts.

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Use the command *buy* to go long and use *sell short* to go short. To close a long trade without reversing position, you use *sell*, while to close a short trade you would say *buy to cover*. I'll keep it simple.

Here are the rules for the first strategy. You buy when price moves higher than the SMA, and sell short when price moves lower than the SMA. Here's the code for this simple strategy:

```
IF close > Average(C, 9) THEN Buy;
IF close < Average(C, 9) THEN Sell Short;
```

Note that *close* refers to the closing price of the current bar, and while the bar is forming, it refers to the current price.

To optimize this moving average, you need to specify an input value. Since an input value is passed into the program by the user, it's easy to change. Here's how you would specify the input value.

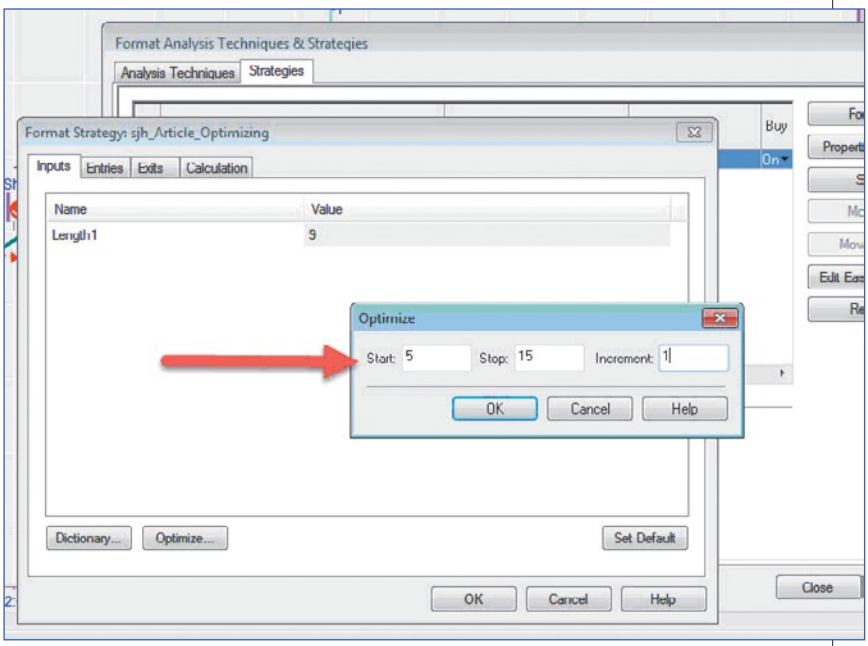

FIGURE 7: SETTING UP OPTIMIZATION PARAMETERS. This is an example of optimizing values from 5 to 15 in steps of 1.

```
INPUTS: Length1(9);
IF close > Average(C, Length1) THEN Buy;
IF close < Average(C, Length1) THEN Sell Short;
```

The beauty of using an input value is evident when you decide to make changes to the value. Most software programs will allow you to change the input values without going into the code. As an example, if you want to optimize values from 5 to 15 in steps of 1 you can do that by a simple mouse click (Figure 7).

OPTIMIZING

Right after the optimization runs, the chart will display new up & down arrows, illustrating the best (most profitable) test from the exercise. In this case, the length value of 15 was the most profitable (Figure 8). And if you wish to check all the tests for comparison purposes, you should be able to pull up those reports.

An optimization report is usually a tabular listing of all of the tests that were run, similar to what you see in Figure 9. If you look at the third column, *all net profit*, you will quickly see that the best test is in the top row, with a loss of $114,487.50. That means that the best test is a loser and all the rest of the tested inputs are worse. You could try this same concept on a different time frame, such as a 60-minute chart, and see how the performance differs. Who knows, perhaps it'll show some winning trades.

ANALYZE YOUR SYSTEM

Most new traders want to take a simple concept, like a moving average, and go right up to bat without testing or doing any further research. I tell folks that you can't wake up one morning and decide to do brain surgery. Similarly, you can't wake up and be an instant trader. It takes a lot of work to become a good trader, and even more work to be a great trader. There are some fairly simple concepts that make money in the markets, but they are not immediately

FIGURE 8: BEST OPTIMIZATION DISPLAYED ON THE CHART. In this case, the length value of 15 was the most profitable, and you can see the trades displayed.

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TradeStation Strategy Optimization Report - @ES 5 min [CME] E-mini S&P 500 Continuous Contract [Sep15]

All data | Robustness Idx Avg: N/A | WFO Suitability: N/A

	rticle_Optim Length1	Test	All: Net Profit	All: Gross Profit	All: Gross Loss	All: Total Trades	All: % Profitable	All: Winning Trades	All: Losing Trades	All: Max Winning Trade	All: Max Losing Trade	All: Avg Winning Trade	All: Avg Losing Trade	All: Win/Loss Ratio	All: Avg Trade	All: Max secu
1	15	11	-114,487.50	515,200.00	-629,687.50	22,217	19.50	4,332	16,363	1,787.50	-2,012.50	118.93	-38.48	3.09	-5.15	6
2	14	10	-121,812.50	526,937.50	-648,750.00	23,075	19.74	4,555	16,905	1,762.50	-2,012.50	115.68	-38.38	3.01	-5.28	6
3	13	9	-118,737.50	542,225.00	-660,962.50	23,831	20.27	4,831	17,286	1,762.50	-2,012.50	112.24	-38.24	2.94	-4.98	6
4	12	8	-116,987.50	559,812.50	-676,800.00	24,769	20.59	5,099	17,838	1,762.50	-1,412.50	109.79	-37.94	2.89	-4.72	5
5	11	7	-120,862.50	577,712.50	-698,575.00	25,873	21.16	5,475	18,447	1,800.00	-1,412.50	105.52	-37.87	2.79	-4.67	7
6	10	6	-118,112.50	601,237.50	-719,350.00	27,079	21.84	5,914	19,054	1,762.50	-1,412.50	101.66	-37.75	2.69	-4.36	7
7	9	5	-126,112.50	621,587.50	-747,700.00	28,513	22.24	6,340	19,947	1,737.50	-1,412.50	98.04	-37.48	2.62	-4.42	7
8	8	4	-128,437.50	648,200.00	-776,637.50	30,251	22.71	6,870	20,871	1,762.50	-1,412.50	94.35	-37.21	2.54	-4.25	6
9	7	3	-141,737.50	676,400.00	-818,137.50	32,391	23.29	7,545	22,068	1,950.00	-1,412.50	89.65	-37.07	2.42	-4.38	7
10	6	2	-152,437.50	710,837.50	-863,275.00	35,071	24.12	8,458	23,481	1,762.50	-1,412.50	84.04	-36.76	2.29	-4.35	7
11	5	1	-164,775.00	750,262.50	-915,037.50	38,436	24.82	9,541	25,295	1,775.00	-1,312.50	78.64	-36.17	2.17	-4.29	8

FIGURE 9: STRATEGY OPTIMIZATION REPORT. You can sort the results by any of the column headings. In this example, the results are sorted based on net profit. The best is listed first—it's not exactly a winner.

self-evident.

Now that you know some optimization techniques, what can you do to find techniques that work? That's a topic for another article. Stay tuned!

Sunny J. Harris is an author, trader, computer programmer, and mathematician who has been trading since 1981. The first printing of her book, Trading 101, *sold out in two weeks and continues to be offered by Wiley; her second book,* Trading 102, *also achieved record sales. In early 2000, Harris released* Electronic Day Trading 101, *followed by* Getting Started In Trading in 2001. *Her latest book is* TradeStation Made Easy. *She may be contacted via MoneyMentor.com.*

Indicators do not give trading signals. It's the strategies that give trading signals that produce profits & losses.

FURTHER READING

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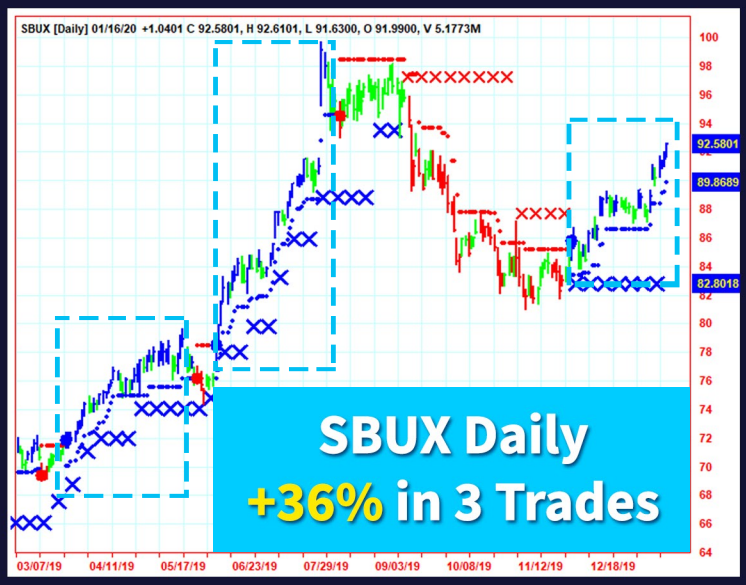

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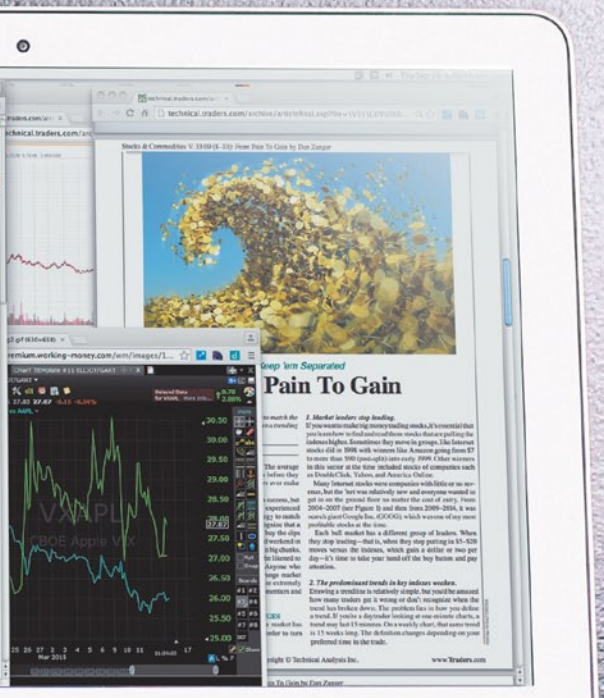

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