

Chapter 7: Optimization, The Double-Edged Sword

The issue of optimization, or to be more exact over-optimization, has taken on greater importance in the last ten years with the advent of personal computers and software such as TradeStation.

Optimization is the process of using historical data to test the effects of slight changes in indicator or strategy criteria. The goal of optimization is to uncover the most profitable or optimal setting for a particular indicator or price pattern traded on a particular security. If, for instance, we want to trade a moving average strategy on Coffee futures, we might arbitrarily pick the 18-period moving average and design a strategy around it. Or, we could test all the moving averages between 1 and 50 and pick the most profitable. This latter process is what is called optimization.

Ever since I have been trading, there has been a continuing debate as to whether optimization is a valid process. There are strong opinions on both sides. The basic controversy centers on the argument that the results of a historical test are not valid because the market never does the exact same thing twice. The market prices will never exactly move in the future as they have in the past.

One side of the argument says that because prices will never move exactly the same, optimization is really fitting the strategy to historical data and is therefore a useless process that simply serves to give historical performance data that is irrelevant in the future. The anti-optimization argument goes on to say that if the trading method has been exactly “fitted” to the historical data, it stands to reason that the technique will not work in the future because future data has no relation

to past data. The traders that take this position usually opt for “soft” trading methods such as the Elliott Wave, Gann techniques, the Market Profile or other generally intuitive approaches to trading.

The irony is that the individuals who decry the perils of optimization also use a type of historical testing to see if their techniques have worked in the past. These soft techniques are “back-tested” by looking at historical charts and estimating where and under what circumstances they would have made a trade. It is very easy to curve-fit the Elliott Wave theory and Gann techniques to historical data, but very difficult to trade them in real time.

I have never seen any performance statistics for those who trade the Elliott Wave or other soft techniques that are superior to the average, statistically sound (and optimized!) trading strategy. Ponder this very important point.

Check out the Commodity Traders Consumer Report, the Hulbert Digest or other trading and investing rating services. What you will find is that all of these trading advisors have trading statistics that are no better than an average trading strategy.

Most of those who argue in favor of optimization do realize that there is a risk of over-optimizing. But our solution is to minimize the chances of over-optimization and curve fitting rather than not use it altogether. Just because over-optimization is a risk does not mean that you should throw the baby out with the bath water and not optimize at all. Just because there is a risk of an accident does not mean you should not drive a car. You just have to know the risks and be careful.

We have to start with the assumption that back testing using quantifiable historical data is a valid method for analyzing price activity and projecting trading profits for stocks and futures, despite the risk of curve-fitting. The reason we make this assumption is that historical data is all we have to go by.

If you think about it, all investments are bought and sold based on some type of historical record. Before we make any investment, we want to see an historical track record. We want to know what return the particular investment advisor has achieved over the last few years in relation to the Dow Jones Average. We want to see how the venture capital fund’s investments have performed over the last few years, or the history of the fund. We want to know how real estate has fared in the area we are buying, and whether the developer has achieved profits on the last few projects.

Sales pitches for common stocks point out the average 15% or so annual return over the last x number of years. The perennial futures strategy seller promotes the

strategy based on the historical track record, either an actual or simulated performance history. And the arguments are similar for numismatic coins and precious metals, bonds and asset allocation strategies, etc.

The sales pitch for all investments is either the trend argument, that the trend is up and will continue up and you should purchase the investment, or the long-term support argument, that the price is at an historic low and the item is so cheap you should buy it now. Both of these arguments reference historical data. You simply can't get away from it.

The reason historical data is used for investment analysis is that there really is no other way to analyze an investment. You find quantifiable historical data and simulate how you would have done if you had taken trades or made investments based on certain techniques. Even those traders who rely solely on fundamentals for trading and investing do so after analyzing how certain fundamentals have affected markets in the past.

In the final analysis, a trading strategy is just another investment, another place to put your money to work with the expectation of above average returns. But there is no logical reason to single out strategy testing and development simply because it tests the return on investment over historical data. All investment analysis uses historical data projected into the future.

I always assume that the market will never move in exactly the same manner twice. If markets were predictable, it would be a simple exercise to find historical patterns and trade them. More people would be successful traders. More traders would make money.

We do not conclude, however, that because of this reality historical testing, optimization, and strategy trading become invalid. Just because the market will not move in exactly the same manner as it has in the past, does not mean that historical testing and strategy trading becomes unsupportable.

Just as a five-year plan for a manufacturing business is undoubtedly not going to unfold exactly as projected, neither is your trading strategy going to unfold exactly as it has in the past.

But even with the risks of over-optimization, the advantages of strategy trading significantly outweigh spending your time learning and trading "soft" techniques. Strategy testing gives you the framework for planning cash flows, projecting

profits, and doing some planning for your trading business. “Soft” techniques do not allow for any planning or projections because their results are not only unpredictable, but also based on non-objective trading judgements.

Your banker would not lend you money for a business without a projection of future cash flow. You would project those cash flows based on either the past history of your company’s cash flow or standard cash flow statistics of similar businesses. You would actually base the cash flow projections on history, and they would be “optimized” into the future making best case assumptions about sales and expenses.

If you went to a banker without projections based on past history, and without “optimistic” projections, he would probably think something was wrong with you and not lend you the money. All of the arguments about the dangers of “over projecting” would probably not sway him to give you the money. And if you told him you would repay him because you can project the cash flow of your company using the Elliot Wave Cash flow theory and Fibonacci retracements of your sales figures, he would probably show you the door.

The point is that financial projections based on historical data and optimization of cash flow is a standard and required business procedure. Most successful business people understand the risks of these projections, and understand that this doesn’t make them useless or irrelevant.

The real issue then is how do you know if a strategy is over-optimized? What are the signs of a curve-fitted strategy?

You know that a strategy is over-optimized and curve-fitted if it misses the move for which it was designed. If you are trading a trend-following strategy and it misses a big move, the strategy is probably curve-fitted to past data. The excess curve-fitting caused the strategy to miss a big move that did not occur exactly as it had in the past.

Unfortunately, this is the only real way of knowing whether your strategy is over-optimized. You must trade it into the future and monitor its performance to make sure it is doing what you designed it to do. It is important to minimize the problem by understanding the role of optimization in strategy testing and the best ways to avoid it, as outlined in this chapter.

Strategy Refinement not Creation

Optimization is one of the last steps in developing your trading strategy. It can be thought of as using a computer to manipulate the parameters of your strategy and then comparing the results of these different parameters.

During strategy development, you are not ready to optimize unless you have a strategy that makes money in its crude form. If your strategy has been tested and you are happy with it, but you feel that altering inputs a bit could make it more powerful, then you are ready to optimize. Optimization is a process used to refine a sound strategy.

Before you start the optimization process, your strategy should be very close to being finished. Many people make the mistake of taking an unfinished strategy and trying to optimize it to complete it. Even more people try to optimize a strategy as their first step! This will only cause you frustration, because optimization will not give you new ideas about what your strategy needs to make it profitable. Optimizing will only take what you already have, and then tell you what parameters will work best with that strategy. In order for optimization to be effective, your strategy should already be making money on your test data when you start the optimization process.

Optimize your strategy in the same manner in which you back-tested your strategy. The optimization should be performed on the same data groups that you used for testing. To get an accurate picture of how changes affect your strategy, change only one parameter or setting in your strategy at a time. For example, change the length of the fast moving-average and see what the results are. When you find an acceptable value, then change the length of the slow moving-average and do the same tests. Generally, when you optimize, adhere to the same standards that you found were important in your historical back testing.

Really, the only difference between historical back testing and optimization is the state of your strategy when you begin each step. When you started testing, your strategy was in its infant stages, and when you optimize, your strategy should be near completion.

Minimize the Dangers of Over-Optimization

There are some steps you can take to minimize the chances that your strategy will be over-optimized. I use this checklist for each strategy that I create to remind myself that curve fitting is a real danger and I have to be cautious while optimizing a strategy.

DEVELOP YOUR STRATEGY BASED ON A MARKET THEORY OR IDEA

Think through the rationale behind every technique and make sure it makes market sense. You should always be able to explain to someone how this indicator works and why this strategy makes money. You must be able to describe the rationale behind the indicator, the entries, and the strategy itself.

This is in direct opposition to simply taking a few moving averages (or some other indicator) and searching for the best parameters. To pick an indicator that you don't understand and does not make market sense and optimize for the best parameters is a real prescription for failure. Make sure your indicators and signals are logical and are designed to capture the market activity that you intend.

KEEP THE STRATEGY SIMPLE

One of my observations over years of strategy development is that profitability of a strategy is inversely proportional to its complexity. Keeping this rule in mind, you should avoid too many signals.

Each additional signal you add to the strategy increases the possibility that all of the signals together, in combination, are curve-fitted for the particular historical data. So keep the number of signals in your strategy to a minimum to assure that in combination they are not over-optimized on the data.

USE THE CONCEPT OF SET-UP AND ENTRY

As I have stressed throughout this book, your chances of producing a sound profitable strategy are dramatically improved by using the concept of set-up and entry. This is the one technique that will help to ensure that you are not making major mental mistakes.

MAKE SURE THE STRATEGY WORKS ON A VARIETY OF SECURITIES

You should be suspicious of a strategy that works well on only one stock or one futures contract. Having said that, there are two schools of thought about this.

The first school is convinced that for any strategy to be valid it must work on a wide variety of futures contracts and stocks, and if it does not, it is not a valid strategy.

The second school of thought believes that each commodity family or stock industry group has a unique personality, and that a strategy can be specific to that particular group. For instance, a strategy that works well with the currencies may justifiably have different parameters than one that works on the grains. But it must work well on most of the currencies.

I think it is best to take a practical approach to this problem and not get all caught up in the theory. That's why I suggest a course of action that should help you develop a strategy specific to your own needs, rather than force you to take a position on either side of this issue.

I recommend that your strategy should be profitable in a wide variety of commodities or stocks, but it does not have to be the optimal strategy for all of them. An example would be if you have developed a trend-following strategy that works well for the Swiss Franc. First, you would want to make sure that it works for other currencies, for example, the Japanese Yen, the Deutsche Mark, and the British Pound. You would also want to ensure the robustness of the strategy by testing it on Crude Oil, or T-Bonds, and maybe a metal or grain.

That is not to say however that the strategy has to be the optimal for each stock or commodity, or that it has to be profitable on all securities. The goal is to test in on a wide enough variety of commodities or stocks so that you feel comfortable that the strategy design is good enough to transcend the commodity or stock industry group.

LOOK AT SURROUNDING PARAMETERS

This is a consideration that is very important and a trap into which many new strategy designers fall.

Let's say that you have come up with a strategy for the software industry that not only works on the index, but also works on most of the stocks. The optimal length for the indicator turns out to be 17. The first thing you should look at is if the surrounding parameters are also profitable. Check the 14,15 and 16 lengths.

Are they also profitable? What about the 18,19 and 20 lengths? These should be profitable as well.

If any of the close parameters on either side of the optimum is not profitable, this should be major red flag that you have over-optimized or that there is a significant flaw in the strategy. If the length of 17 was the only profitable parameter out of the lengths on either side, there are probably one or two trades that were taken that caused this anomaly. This strategy is extremely suspect and a great deal more investigation should be done.

If, on the other hand, all surrounding parameters are profitable, although admittedly not as profitable, you can be reasonably assured that you have not curve-fitted the strategy and that it is robust.

DO SOME FORWARD AND BACKWARD TESTING

Forward testing takes the optimal parameters from the past and carries them forward into the more recent past. For example, you could find the optimal parameters from 1982 to 1992, and then test these parameters from 1992 to the present. If the strategy was profitable when carried forward, you have increased the reliability of the historical results.

I also back test. I optimize for the most recent 7 to 10 years and then test these parameters in the 10 years before that. For example, I might do an optimization for 1990 to 1995 and then back test it from 1985 to 1990.

The third part of this technique is to be creative and literally mix it up. Optimize for 3 or 5 years here and then test it there. The more mixing up you can do, the more information as to the best parameters you will get, and the more confidence you will have in your strategy.

Table 1 is a summary of the steps for minimizing the dangers of over-optimization. The first three are mental concepts that you should use as you intellectually organize and develop your strategy. The second three are practical considerations to keep in mind as you test your strategy. If you use all of these techniques, you should greatly reduce the chances of over optimizing your strategy.

Minimize the Dangers of Curve Fitting

1. Base strategy on market theory and observation
2. Avoid too many entries and exits
3. Use set-up and entry
4. Test a variety of markets/stock industry groups
5. Forward and backward test
6. Look at surrounding parameters

Optimization can move your strategy from being profitable to being extremely profitable. It is a valuable tool that allows you to play with the parameters of your strategy without changing its core functions. Optimization can answer such questions as, “What is the best fast moving-average length to use?” Many people mistakenly use optimization to force an incoherent strategy towards completion. When used correctly to fine-tune a sound, profitable strategy, optimization is an important step that is necessary to prepare your strategy for real-time trading.

The Optimization Process

Let's look at the process of optimization. Before we optimize, we need a trading idea. Then we need to design a sound, profitable strategy. Once we have tested the strategy and are sure it is profitable, then and only then will we consider optimization.

TRADING IDEAS

The strategy creation process itself is a wonderful source for ideas. It is not unusual for me to accidentally fall into something that works as I am working on some other idea.

In Chapter 4, we were working on set-up and entry, and we ended up using the highest high of the last 50 bars and the lowest low of the last 50 bars to guarantee that we would always be in for the big move. When we looked at the summary in Table 1 in Chapter 4, we found that this component of the strategy performed very well on its own. We then put this in our arsenal of ideas to test in future. And here we are.

The appeal of using the highest high and the lowest low is that this technique is very simple trend-following technique, and it meets all of our set-up and entry criteria.

First we find the highest high of the last 50 bars. Then we put a buy stop one tick above that price. When the prices move through that particular price, we enter into a long position. We use the same procedure in reverse for the short side.

The set-up for our strategy is the designation of the actual highest high (or lowest low) of the last 50 bars. We assume that if the price moves through either of these prices, the trend has changed.

The entry is a price move through this price point. This breakout entry fits both our entry rules. The price movement confirms the direction of the set-up (Entry Rule #1) and since it is a reversal order and we are in the market at all times, it also ensures that we will never miss the big move (Entry Rule #2).

Chart 1 is a weekly chart of the Dow Jones Industrial Average with the highest high (“HH”) of the last 50 bars and the lowest low (“LL”) of the last 50 bars as a price channel. The entries are flagged where the strategy took a long position as it passed through the upper channel line and went short as it passed through the lower channel line.

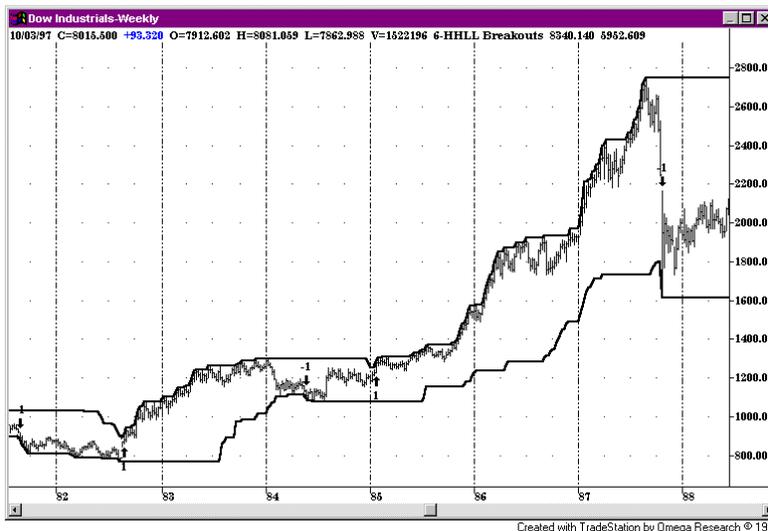


Chart 1

TradeStation Easy Language
Indicator: HHLL Breakouts
 inputs:HH(50),LL(50);

Plot1(Highest(High,HH)[1],"HH");
 Plot2(Lowest(Low,LL)[1],"LL");

As you can see in Chart 1, each time the price of the Dow moved through the highest high channel or lowest low channel we had a change in position. Also, you will notice that the strategy gets in for all of the big moves. It was long from 1982 through mid-1984 and again from early 1985 through the crash of 1987.

To enter the market, the price only has to reach one tick above the 50-week high, or one tick below the 50-week low. Once either of these prices is hit, which is technically on a stop order, we would be long or short. This strategy is always in the market. We will never miss a big move.

SPF 1 is the Strategy Parameter File for this strategy. I have arbitrarily picked 50 weeks as the length for the highest high and the lowest low. But this may not be the optimum length. I picked 50 periods because I happened to remember that I read somewhere that a breakout to a new annual high is significant in the stock market. Remember, I thought that 50 periods was close enough to a year so I just arbitrarily went with that number.

Strategy Parameter File HH LL Breakouts			
Set-Up	50-Period Highest High or Lowest Low		
Entry	Breakout over HH or under LL		
Stops	None	Exits	None
MaxBarsBack	50	Slippage	0
Margin	None Used	Commission	0
Data Source	Dow Jones Industrials – Dial Data		
Data Duration	1/9/70 to 8/8/97		

SPF 1

Obviously you are not able to trade the Dow Jones Industrial Average. In this case we would use this as a proxy to either buy or sell stocks or mutual funds, or to buy or sell a basket of stocks.

You would be long stocks when the strategy was bullish. You would be short or out of the market when the strategy was bearish.

The performance results of this strategy are in PS 1. As you can see, this strategy performed reasonably well.

Performance Summary: All Trades			
Total net profit	\$ 4642.68	Open position P/L	\$ 0.00
Gross profit	\$ 6247.05	Gross loss	\$ -1604.38
Total # of trades	17	Percent profitable	41%
Number winning trades	7	Number losing trades	10
Largest winning trade	\$ 5108.22	Largest losing trade	\$ -527.33
Average winning trade	\$ 892.44	Average losing trade	\$ -160.44
Ratio avg win/avg loss	5.56	Avg trade(win & loss)	\$ 273.10
Max consec. winners	3	Max consec. losers	4
Avg # bars in winners	133	Avg # bars in losers	46
Max intraday drawdown	\$ -822.54	Max # contracts held	1
Profit factor	3.89	Return on account	564%
Account size required	\$ 822.54		

PS 1

**TradeStation EasyLanguage
Strategy: H-HLL Breakouts**

Inputs:HH(50),LL(50);
IncludeStrategy:"Exit on 8/8/97";

Buy("hh") at Highest(High,HH)
+ 1 point Stop;
Sell("ll") at Lowest(Low,LL)
- 1 point Stop;

Although the performance is OK, I have a couple of concerns. First, from 1970 to 1997 the Dow gained 7,200 points, moving from roughly 800 to approximately 8,000. The strategy captured 4642 points or almost 65% of the move. I would like to see more. Nevertheless, the trend trader's goal is to capture most of the middle of the move, and this strategy accomplished that goal.

Second, if you look at Chart 1, you will see that the strategy got short right at the bottom of the 1987 crash. Even though it was a profitable trade, I would have preferred an earlier exit. This is a problem we will need to deal with. There was nothing else that concerned me when I scrolled through the strategy looking at the entries and exits with TradeStation.

Now, we need to see if optimizing the lengths of the highest high and lowest low would improve the performance. Our first concern is that the strategy in its raw form is profitable and that we not optimize to make a strategy profitable, but to improve its profitability. We are OK because this strategy is pretty good as it is.

Another major strategy consideration for me is trying different lengths for the buy side and the sell side. You might be tempted, as I have been, to keep the buy length and the sell length the same. However, over the years I have found that generally it is much more profitable to separate the two.

In most cases, you will find that the more profitable strategies have shorter lengths for the long side. I have pondered this phenomenon for many years and have concluded that it just takes markets longer to go through the topping process than to make a bottom. In almost every strategy I have tested, the optimal parameters for the sell side were longer than those for the buy side. Let's see how it works with the HHLL strategy.

The Strategy Parameter File is exactly the same as in SPF 1 except that we put in a range of values for the HH and the LL. For this test, I used from a length of 5 to 50 with an increment of 5, for both the HH and the LL. The results are in Opt Table 1.

HHLL 1/1/70 to 8/8/97									
HH	LL	Net	Long	Short	P-Fact	ROA	MAXD	#	% Prof
5.00	50.00	6285.12	6793.35	-508.23	5.91	1338.74	-469.48	31	39
5.00	45.00	6201.21	6751.39	-550.18	5.64	1280.62	-484.23	33	36
20.00	50.00	6146.20	6723.89	-577.68	7.20	1094.61	-561.50	17	53
15.00	50.00	6117.93	6709.75	-591.82	7.02	1247.99	-490.22	19	53
5.00	40.00	6067.82	6684.69	-616.88	4.91	1193.58	-508.37	39	31
20.00	45.00	5928.84	6615.21	-686.37	6.20	1055.90	-561.50	19	42
15.00	45.00	5917.21	6609.39	-692.18	6.15	1207.04	-490.22	21	43
15.00	40.00	5902.99	6602.28	-699.29	5.77	1204.14	-490.22	23	39
10.00	50.00	5894.49	6598.03	-703.54	5.30	1171.13	-503.32	27	37
20.00	40.00	5887.66	6594.62	-706.96	5.69	1048.56	-561.50	21	38

Opt Table 1

**TradeStation
Optimization
Strategy:
HHLL Breakouts**

Buy: 5 to 50 by 5
Sell: 5 to 50 by 5

Note: None of the parameters on the short side were profitable. This makes sense since we have been in a bull market for at least the last 15 years.

The best lengths for the HHLL breakouts were 5 on the buy side and 50 on the sell side. That means that you would buy at the Highest High of the last 5 bars and sell at the lowest low of the last 50 bars. I have printed out as Opt Table 1 some of the performance data. It is sorted for the best Net Profit, but we could have sorted it for any of the performance criteria

The next best parameters are the 5/45 but this is so close to the 5/50 that I basically would just throw it out. The third best parameter is the 20/50. This is a real possibility. So I would at this point just focus on these two options.

One major note, at this point we can conclude that since all of the top ten parameter choices are very close, we have met the criteria that the surrounding parameters are profitable. If we wanted to, we could do a more detailed test for this, but I don't feel it would be necessary at this point.

Another major observation is the number of trades and the % profitable. The 5/50 parameters have 31 trades with 39% profitable. The 20/50 parameters have 17 trades with 53% profitable. Which of these would be easier to trade? The profits, \$6,285 and \$6,146 respectively, are close enough to be indifferent. So, if we conclude that the profits are close enough, I would prefer a 53% shot with less trades than a 39% shot with almost double the trades.

The drawdown comparison between the two is also so close that I would call it a draw. The 100 points over a 27-year period are just not enough to get worked up about. But the profit factor is important. A 7.2 versus a 5.9 profit factor is significant, and enough again to argue for the 20/50.

OK, so I am now convinced that the 20/50 is the parameter lengths of choice.

Do you think that if we looked at different decades this would hold true? Do you think that the optimal parameters for the 1970s would be the same as the 80s and 90s? What if all of the profits from the 5/50 parameters were made in the last 10 years, or the first 10? Let's check out the different decades, starting with the 1970s in Table 2.

1/1/70 to 1/1/80										Opt Table 2 The 1970s
HH	LL	Net	Long	Short	P-fact	ROA	MAXD	#	%	
20.00	50.00	325.48	166.66	158.83	2.71	133.79	-243.28	7	57	
40.00	50.00	245.41	126.62	118.79	6.06	227.02	-108.10	5	80	
20.00	30.00	225.38	104.80	120.57	1.77	69.94	-322.27	9	44	
25.00	50.00	200.62	104.23	96.40	1.90	76.11	-263.61	7	57	
20.00	35.00	178.81	75.07	103.75	1.56	53.51	-334.17	9	44	
15.00	50.00	159.17	83.50	75.67	1.52	46.40	-343.06	9	56	
45.00	50.00	158.11	82.97	75.14	4.26	146.26	-108.10	5	80	
20.00	25.00	132.18	58.20	73.97	1.32	44.78	-295.19	11	36	
50.00	50.00	129.72	68.78	60.95	3.46	115.46	-112.35	5	80	
20.00	40.00	129.05	50.19	78.87	1.38	36.37	-354.82	9	33	

Opt Table 2 shows that in the 1970s, the 20/50 lengths were the most profitable. If you scroll the chart of the 1970s, you will see that it was indeed a trendless, sideways market with major bull and bear markets. Support/resistance traders made good money in the '70s but were crushed with the bull market of the '80s. The fact that the 20/50 made money in the '70s is impressive given it is a trend-following strategy trading in a sideways market.

HHLL 1/1/79 to 1/1/90										Opt Table 3 The 1980s
HH	LL	Net	Long	Short	P-fact	ROA	MAXD	#	%	
5.00	15.00	1720.75	1817.40	-96.64	2.85	546.58	-314.82	27	37	
15.00	15.00	1412.84	1663.44	-250.60	2.69	386.21	-365.82	19	47	
10.00	15.00	1356.45	1635.25	-278.80	2.35	358.54	-378.32	23	39	
30.00	15.00	1312.14	1613.09	-300.95	2.65	358.69	-365.82	17	41	
20.00	15.00	1280.26	1597.15	-316.89	2.48	347.22	-368.72	19	47	
25.00	15.00	1222.70	1568.37	-345.67	2.38	321.63	-380.16	19	42	
35.00	15.00	1216.64	1565.34	-348.70	2.53	332.58	-365.82	17	41	
40.00	15.00	1201.28	1557.66	-356.38	2.51	328.38	-365.82	17	41	
45.00	15.00	1201.28	1557.66	-356.38	2.51	328.38	-365.82	17	41	
50.00	15.00	1196.53	1555.28	-358.76	2.51	327.08	-365.82	17	41	

In Opt Table 3 for the 1980s, we see that the '80s were a very different market for this strategy. The best parameters all had lowest low parameters of 15. Since the LL parameter of 15 did not show up in the '70s or in the overall test, I look at these numbers as unusual. I really can't make any judgement about these numbers until I look at the '90s.

HHLL 1/1/89 to 8/8/97									
HH	LL	Net	Long	Short	P-fact	ROA	MAXD	#	%
5.00	40.00	5316.72	5369.01	-52.29	22.23	1441.88	-368.74	3	33
5.00	45.00	5284.45	5352.88	-68.43	19.69	1317.82	-401.00	3	33
5.00	50.00	5284.45	5352.88	-68.43	19.69	1317.82	-401.00	3	33
10.00	40.00	5258.32	5339.81	-81.49	19.81	1231.07	-427.14	3	33
10.00	45.00	5226.05	5323.68	-97.63	17.76	1137.58	-459.40	3	33
10.00	50.00	5226.05	5323.68	-97.63	17.76	1137.58	-459.40	3	33
15.00	40.00	5122.18	5271.74	-149.56	15.73	1203.36	-425.66	3	33
20.00	40.00	5116.72	5269.01	-152.29	15.60	1316.92	-388.54	3	33
15.00	45.00	5089.91	5255.61	-165.70	14.40	1111.53	-457.92	3	33
15.00	50.00	5089.91	5255.61	-165.70	14.40	1111.53	-457.92	3	33

Opt Table 4

The 1990s

The 1990s are delineated in Opt Table 4. Note that the LL parameters are back in the 40s and 50s and the HH parameters are between 5 and 20. What this tells me is that the '80s were unusual. It also tells me that the 20/50 would be OK in the '90s although not in the top ten.

So, now let's put together the whole picture for the 20/50. This is in Opt Table 5.

HH	LL	Net	Long	Short	Pfactor	ROA	MAXID	# TR	% PR
1970s									
20.00	50.00	325.48	166.66	158.83	2.71	133.79	-243.28	7	57
1980s									
20.00	50.00	777.87	1345.95	-568.09	2.23	138.53	-561.50	9	44
1990s									
20.00	50.00	5084.45	5252.88	-168.43	14.29	1208.28	-420.80	3	33
Total									
20.00	50.00	6146.20	6723.89	-577.68	7.20	1094.61	-561.50	17	53

Opt Table 5

You will note that the individual performance summaries don't add up to the total, and add up with more trades.

This is because the 1980s and 1990s starts flat and gives us two extra trades. This is nothing to be concerned about.

Note that these parameters are profitable in each of the decades, and that the big profits came from the trades in the 1990s. Thus the strategy parameters that we picked, the 20/50 were profitable in each decade in three completely different markets; we also caught the big moves.

This strategy would work particularly well if you were only going to use it for long trades. Get long on the 20-week upside breakout and get out of the market on the 50-week downside breakout. You could then either buy a mutual fund, or purchase stocks based on the same indicator. The combinations are limitless.

You might also try other entries. One interesting technique is to not buy an intra-week breakout but insist that the week's close be above the 20-week high or below the 50-week low. This requirement would have eliminated the short in the week of the 1987 crash. The downside to this is technique is that it sometimes gets you in the move very late. So you would have to analyze the tradeoff for yourself and see if it makes sense.

Summary

So did we minimize the negative effects of optimization? Yes, we did.

First, we based the indicator on market theory and observation in that we knew that breaking into a new high for the last year is significant in the stock market.

Second, we only have one entry and exit and they are easy to understand. So our strategy is not overly complex.

Third, we used set-up and entry and made sure we followed the set-up and entry as we created the strategy.

Fourth, I scrolled through each of the Dow stocks after applying this strategy and found that only three lost money and a couple of them were close to breakeven. So on 25 of the 30 Dow stocks, this strategy worked great. I also ran through some high tech stocks and they worked great as well. As long as you picked your stocks well, and chose stocks that trend with the Dow, you did well.

I then scrolled through weekly charts of the commodities on the Omega Research Historical Data CD. Almost all of them were profitable. There were many that you might not want to take the drawdown, and some with a low percentage profitable trades. But for the most part this strategy is universally sound on other stocks and commodities. It passes the fourth test.

Fifth, we looked at each decade, and chose our parameters based on the performance in each decade. This is not the only way to do backward and forward testing, but it is a sound practice. This is my short way of testing in the '70s and trading in the '80s, etc. We certainly could have optimized and rolled forward, but I use this technique because it gives me more useful information.

And we know that the surrounding parameters were profitable. We could perform additional tests for this, but it was very clear from all of the tests we did look at that the surrounding parameters are profitable. As a matter of fact, all of the parameters were profitable. This is the sign of a very robust strategy.

So was optimization worthwhile? Would you rather trade the 20/50 than the 50/50. I would.

Did we over-optimize? Can we be accused of curve-fitting the strategy to historical data? With all of the data we looked at and knowing the performance changes with the differing markets, I would say no. We are going into trading this strategy with our eyes open—we know the type of markets in which this strategy works best and those in which other parameters would be better.

Optimization is a tool that can greatly enhance your knowledge of each strategy—your knowledge about what works in different types of markets—and give you confidence that even if your trading gets tough, you will know what to expect. This is what running a business is all about.

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