Less is more

Entering the market is the easy part. But once you're in, you'll need to figure out when to exit or add to your position to maximize your returns in the long run.

By Mike Chalek

A famous trader in the early 1900s described technical analysis as "the study of factors arising in the market itself which can influence price movement without regard to fundamental considerations."

Technical trading systems reflect this by using a set of specific rules that generate a set of entry and exit signals for the trader to act upon, no matter what the fundamental circumstances might look like.

Analyzing entry and exit signals in relation to the outcome of trades helps determine the true effectiveness and efficiency of a trading system. The rules of a specific system are not important because we simply are trying to understand the characteristics of the different trades in order to perform a kind of strategy "tune-up."

This type of analysis, known as Maximum Adverse Excursion (MAE) and Maximum Favorable Excursion (MFE), was popularized by John Sweeney in his books *Campaign Trading: Tactics and Strategies to Exploit the Markets* (John Wiley & Sons, 1996) and *Maximum Adverse Excursion: Analyzing Price Fluctuations for Trading Management* (John Wiley & Sons, 1997). All you need to calculate MAE/MFE are the entry points for each trade, the subsequent price action within the trades and their individual exit points.

You can increase profits and decrease drawdown by optimizing your exit techniques.

The MAE level for each trade is defined as the lowest low of the open profit within the trade or, stated differently, the maximum open loss within the trade (which would be zero if the trade is never in negative territory). The MFE level is defined as that point within the trade where the open profit is at its peak value.

Many of us are more or less concerned with our trading systems when it comes to excursion analysis, especially if we already have a system that makes us money, but also constantly keeps us on edge because of large price swings. Analyzing the low or negative extremes of the price movements within each trade (the MAE) provides a good indication of where to place your initial stop-loss or trailing stop orders. But did you also know you could increase profits and decrease drawdown by optimizing your exit techniques and maybe even cutting the winners short as well?

This is the MFE part of the MAE/MFE analysis. It can be done without changing the system's rules or adding any more variables. For this article, we will use the Portfolio Maximizer software package that was co-developed by Omega Research Inc. (www.omega research.com) and Rina Systems Inc. (www.rinasystems.com). Rina Systems considers MFE to have support and resistance characteristics in much the same manner as regular price charts.

The theory is that when price penetrates a specific resistance level, that resistance level becomes a future support level. The same concept can be applied once an open profit has penetrated a specific dollar or percentage level, which also is just another way of measuring the momentum of the trade (as opposed to using a traditional momentum oscillator). When the open profit penetrates a resistance level, the trade typically remains above that

level for the remainder of the trade. The goal of this strategy, once the resistance level becomes identified, is to add to existing positions to improve total performance.

After all, the open equity of each trade will always be a perfect image of the corresponding price moves in the market, but on a different scale. So, instead of analyzing support and resistance on a price chart (not knowing if it would be relevant because we don't know whether or not we would have been in a trade at that particular time), we instead analyze support and resistance on the open equity of each trade, where it will be of more importance.

Most systems end up giving back much of their open profits.

An alternative approach is to examine what happens to a trade a certain number of days after it has been entered. The following example will look at ways to improve a short-term, trend-following, stop-and-reverse system that is always in the market, either by adding to the original trade at a specific day or by taking advantage of any possible profit targets before the system reverses on the next signal. We will call this type of analysis TBE or Time-Based Excursion analysis. The market traded is the S&P 500 index futures market from January 1999 through June 2000. Note: The following numbers don't say anything about the end result of the trade, but only indicate the likelihood for a certain profit target to be reached or not.

FIGURE 1 PROFIT TARGET LIKELIHOOD

You can get a good indication of whether momentum is working for a trade and whether you should add to the trade by measuring the likelihood of meeting different profit targets after a trade has lasted a certain number of days.

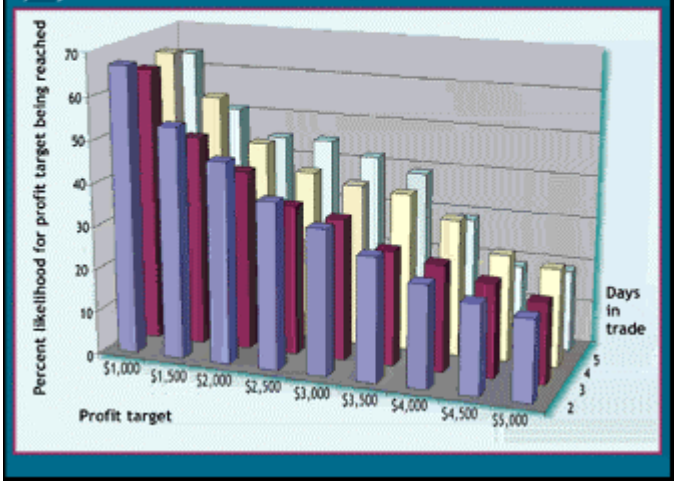


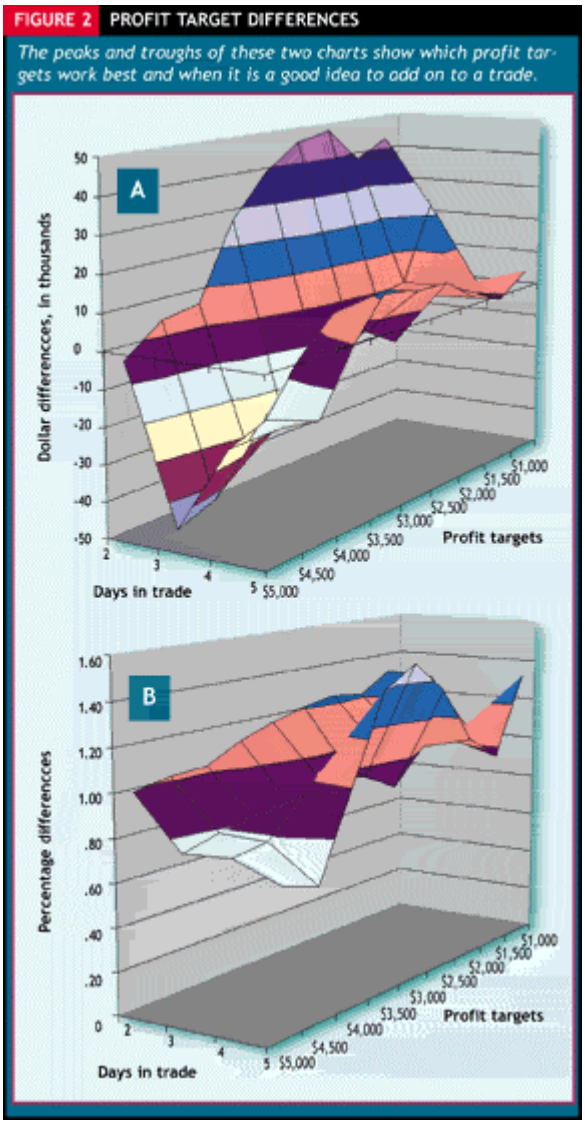
Figure 1 (above) shows that on the second day after the original entry signal, there is a 67 percent chance that the trade will reach an open profit of $1,000, which gives it a mathematical expectancy of $670 (0.67 * 1,000). There is a 19 percent chance it will reach an open profit of $5,000, for a mathematical expectancy of $950 (0.19 * 5,000).

However, this analysis says nothing about what happens to all the losing trades. Table 1 (below) shows, with a $1,000 profit target, of all trades still open on the second day, the winners amounted to $180,000, while the total amount lost for all those trades that didn't reach the profit target amounted to -$137,500. For the $5,000 profit target, the same numbers come out to $260,000 and -$264,000, respectively, thus rendering a net loss of $4,000. This shows that you cannot look at profits alone when deciding where to place your profit target.

TABLE 1 GOOD TRADES, BAD TRADES

Not all trades will reach the specified profit target. The ones that dont will end up as losers. The day-to-day change between the winners and the losers for a specific profit target will help you identify shifts in momentum and when it could be a good idea to add to a trade.

Targets	Day 2 (Win)	Day 2 (Loss)	Day 3 (Win)	Day 3 (Loss)	Day 4 (Win)	Day 4 (Loss)	Day 5 (Win)	Day 5 (Loss)
$1,000	$180,000	-$137,500	$101,000	-$78,000	$40,000	-$40,000	$20,000	-$15,000
$1,500	$217,000	-$179,000	$115,000	-$114,000	$51,000	-$50,000	$24,000	-$25,000
$2,000	$252,000	-$204,000	$132,000	-$133,000	$56,000	-$55,000	$28,000	-$26,000
$2,500	$267,000	-$221,000	$140,000	-$154,000	$60,000	-$70,000	$35,000	-$26,000
$3,000	$276,000	-$237,000	$156,000	-$170,000	$69,000	-$73,000	$39,000	-$26,000
$3,500	$276,000	-$249,000	$150,000	-$178,000	$77,000	-$73,000	$42,000	-$30,000
$4,000	$260,000	-$254,000	$156,000	-$191,000	$76,000	-$81,000	$36,000	-$36,000
$4,500	$261,000	-$257,000	$157,000	-$200,000	$67,000	-$86,000	$27,000	-$44,000
$5,000	$260,000	-$264,000	$150,000	-$203,000	$70,000	-$93,000	$30,000	-$45,000



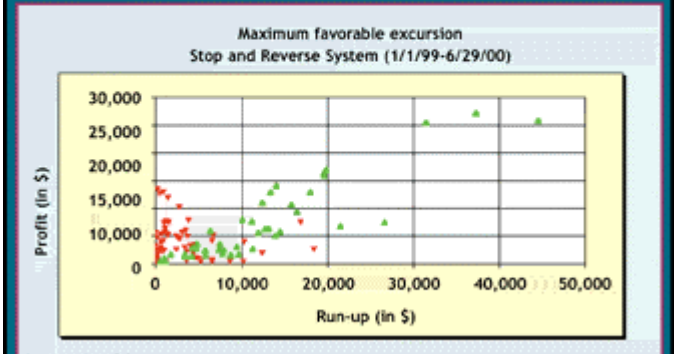
Note, however, that for the furthest row of columns in Figure 1, which represents the likelihood for a certain profit target to be reached after the fifth day of the original entry, there is a little hump between the profit target levels $2,000 and $3,500. This indicates the mathematical expectations for these levels are even higher when the trade has lasted at least five days.

To investigate this further, you can look at Figures 2a and 2b (above), which show the differences between the gross profits and the gross losses, in dollars and percentages, respectively. Note that for days 3 and 4 it doesn't seem to matter where you place the profit target -the overall result for the system will be a net loss anyway. But at the fifth day of the trade, something interesting happens. Suddenly the profit targets in the $2,000 to $3,500 region become net profitable again. It is almost as if the market, after an initial pullback and some hesitation after the entry, confirms that the original entry signal was valid and it now, therefore, could be worthwhile to add to the trade (if it is, in fact, profitable).

Yet another application of the MFE concept is to look at the maximum open profit of the trade in comparison to its final profit. Trend-following breakout trades tend to rack up good profits only to give back a large portion of those profits before the system signals an exit. Figure 3 (below) shows the relationship between each trade's open profit and its final outcome. The horizontal axis represents the maximum open profit for each trade, while the vertical axis represents the closed profit or loss for each individual trade. Both winning and losing trades are plotted on the same graph. The green triangles, pointing upward, represent winning trades and the red triangles, pointing downward, represent losing trades.

FIGURE 3 PROFIT TARGET LIKELIHOOD

By comparing each trades maximum open profits with its end result you can get a feel for where to take profits before the momentum of the trade turns against you.



Source: Portfolio Maximizer

From Figure 3 you can determine on a trade-by-trade basis just how efficient the system is. For example, the most ideal trade would be a winner with an immediate equity run-up of $10,000 and a subsequent close out of the trade with a profit of $10,000. You could then say that the trade was 100 percent efficient. The sign of a good system is the clustering of small losing trades with a low run-up in equity and a clear line of winning trades in a 45-degree angle. The closer the trades hug the 45-degree line, the more efficient the system is. However, most systems do not display 100 percent efficient trades and consequently end up giving back much of the open profits.

Studying a chart like this is an excellent way of evaluating the relative efficiency of individual trades. For one thing, you should be able to detect individual trades where it would have been beneficial to capture profits before the system would have closed out the trades. By doing this, you are maximizing the trade before the momentum fades away.

For greater flexibility, you also could split the analysis between long and short trades. (As it stands, you don't know if a particular trade was long or short.) Doing this you also would be able to detect if the system is likely to perform better on a particular side of the market. For instance, an MFE chart with most of the trades clustered in the lower left corner usually implies the market is not particularly prone to trending.

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In the case of this particular system, there is an abundance of winning trades clustered between the $10,000 and $30,000 maximum open profit trading range. (There also were three trades with a maximum run-up exceeding $30,000, but we'll leave them out of the discussion for now.) In fact, there are 19 winners and five

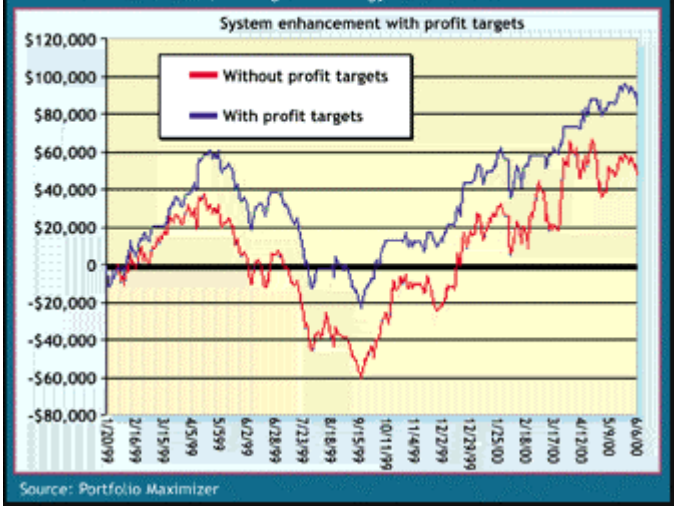
losers within that open equity range. Comparing each trade's maximum open profit with its end result, it becomes obvious that trades in that dollar range give back a large percentage of their gains by the time the trade is finally closed out.

Now, consider what the result would be using a profit target of $10,000. As you can see, there are five losing trades that generated a total net loss of $40,000. With a $10,000 profit target, you would have converted all of them into winners and the $40,000 net loss would now be a gain of $50,000. That would add $90,000 to your account equity and would have reduced the drawdown.

However, at the same time, out of the other 19 trades that turned out to be winners, eight trades originally would have made more than $10,000, for a total of $109,000. If we use a $10,000 profit target on these trades, they would have only made $80,000, thus, decreasing the bottom line by $29,000 compared to the original system. For the 11 remaining trades, which only generated a total net profit of $66,000, using a profit target of $10,000 per trade would have generated a total net profit of $110,000, an increase of $44,000.

FIGURE 4 EQUITY IMPROVEMENTS

Not only will a profit target increase your final equity, it also is very likely to decrease the drawdown, making the strategy easier to trade.



Source: Portfolio Maximizer

For all trades the total net profit would have increased by $37,000 to $85,000, with the average profit per trade going from $457 to $825. Figure 4 (above) compares the equity curve for the original system (in red) and the equity curve for the system with the profit target added (in blue).

But how do we handle the remaining three trades on the far right of Figure 3? In statistics, these trades are called "outliers" because they are more than three standard deviations away from the value of the average trade and, as such, are considered "freak occurrences" and therefore not used in our analysis.

Nonetheless, there will be times when you will miss a really big move using profit targets, but overall, using a profit target should have a soothing effect on your nerves while at the same time increasing your bottom line. In fact, even though you had to treat those three big winners with only a $10,000 profit per trade, you still would have ended up net positive, because when the market is in a trending mode a profit target will allow you to break up a huge winning trade into several smaller ones, something that is not accounted for in this analysis.