

Using standard measures of system performance we can determine how to combine various classes of trade exits to devise the best overall exit strategy logic.

Measuring exit strategy performance

BY PAUL M. KING

To understand which elements of your system perform well under certain circumstances, you first need an objective measure of system performance.

Although there are several measures that you can use to judge system performance, a single measure called "system value" captures system performance in several areas, such as profit (or loss) per unit risked, the variability of profits and losses and the number of trades per period.

Last month in "Exits are where the money is," we introduced four main types of exits that can be used in a trading system: discretionary, inactivity, risk management and profit taking. We then introduced six different systems paired with a specific exit type. Here, we will take our analysis to the next level using the system value measure to determine which exit strategy performs the best in each of the various systems.

SYSTEM VALUE

To compare each instance of a trading system as we change and add exit strategies we will use an adaptation of the system value. Because we are using fixed

position-sizing and basing our trades on the cash S&P 500 index — which although there are many products based on it is technically a theoretical instrument — we will adapt the system value formula to our requirements.

System value is a relative measure of performance; the higher the value, the better the system. It is based on profit (or loss) per unit risk, the variability of profits and losses and the number of trades per period. Because we are not using stops for most of our demonstration systems, we do not have an initial stop — there is no quantified initial risk, so we will use this formula:

$$\frac{\text{Average(Profit or Loss in Points)}}{\text{Standard Deviation(Profit or Loss in Points)}} * \text{Number of Trades in Testing Period}$$

Additional data that may be useful for comparison purposes are the average size of winners compared to losers, the winning and losing percentage and the number of trades per year. We're also interested in the total points profit, or whether the system makes any profit

overall, not including implementation costs (such as commission and slippage).

Although some of the Tradestation code is presented here, the complete code for each system is available for download at www.futuresmag.com.

FIXED EXIT

System One is our control system. It's a moving average crossover entry (see "12 days and done," right). The exit is fixed at 12 bars. This forms the baseline for our comparisons because it has no other exit strategies.

Here are the performance statistics:

System value: 1.67
Number of trades: 21
Win percentage: 52%
Average winner (points): 61.52
Average loser (points): -54.18
Profit (points): 134.99

Because there are no price-based exits, this system basically takes unlimited risk from the entry to the fixed time exit — price could theoretically go anywhere during the life of the trade and we would not exit.

The points profit is therefore misleading because we are taking virtually unlimited risk.

Also, the average size of winners is not much bigger than losers, which means we must rely on a higher winning percentage to make money. Because the winning percentage will move toward 50% through time (that is, random) for an arbitrary fixed exit, this system is of little real value.

HIGH WIN EXIT

System Two demonstrates how a high winning percentage can be achieved simply by changing the exits. This system exits after one bar if the trade is a winner. It also has a 100-bar fixed exit to finally unload long-term large losing positions. The 100-bar exit rule is primarily for house-cleaning purposes.

System value: 0.73
Number of trades: 22
Win percentage: 77%
Average winner (points): 17.10
Average loser (points): -249.13
Profit (points): 41.50

This system's winner vs. loser size is much worse because we are taking profits immediately, but letting losses mount. Even though the higher winning percentage is psychologically comforting because we get to be right a lot, the actual profit is worse than in System One because all the small winners are wiped out by big losers. System value also is below 1.00, which indicates a poor system.

LOW WIN EXIT

System Three shows how a low winning percentage can be achieved simply by changing the exits. This system exits after one bar if the trade is a loser. As with System Two, it also has a 100-bar fixed exit for practical reasons to finally remove large long-term winning positions.

System value: -7.67
Number of trades: 44
Win percentage: 5%

Average winner (points): 311.42
Average loser (points): -28.99
Profit (points): -594.60

Although the average winner is now much bigger than the average loser, this system's winning percentage is low enough to completely wipe out that advantage. The number of trades has also gone up because

losers are exited quickly so new signals can be taken.

Taking losses quickly is a good thing to do, but in this case we do not have a way of protecting the profit from winning trades, so the moment they turn from winners to losers they are exited and the profit slips away. The system value is indicative of a system that consistently loses money.

12 DAYS AND DONE

This is the code for our control system. It enters on a moving average crossover and exits after 12 bars.

System 1: Fixed 12-Bar Exit

```
// SPX System 1 - Basic Long/Short SMA cross entry, fixed 12 bar exit  
  
// Hypothesis: Be long when it's going up and short when it's going down  
// Entry: Close crosses SMA(12)  
// Position Sizing: Fixed 1 share  
// Exits: Fixed exit in 12 bars
```

variables:

```
int inposition(0), // Are we in a position or not -1 short, 0 out, 1 long  
int entrybar(0); // Bar we entered on
```

```
// Check for long entry  
if (inposition=0 and Close crosses above Average(Close,12)) then  
begin
```

```
    inposition=1;  
    entrybar=BarNumber;  
    Buy ( "Buy" ) 1 share next bar at market;
```

```
end;
```

```
// Check for short entry  
if (inposition=0 and Close crosses above Average(Close,12)) then  
begin
```

```
    inposition=-1;  
    entrybar=BarNumber;  
    Sell short ( "Short" ) 1 share next bar at market;
```

```
end;
```

```
// Exit long in 12 bars  
if (inposition=1 and BarNumber>=(entrybar+12)) then  
begin
```

```
    inposition=0;  
    entrybar=0;  
    Sell ("Exit Long") 1 share next bar at market;
```

```
end;
```

```
// Exit short in 12 bars  
if (inposition=-1 and BarNumber>=(entrybar+12)) then  
begin
```

```
    inposition=0;  
    entrybar=0;  
    Buy to cover ("Cover Short") 1 share next bar at market;
```

```
end;
```

Source: PMKing Trading LLC

INACTIVITY EXIT

System Four has an inactivity exit that closes trades after six bars if there is less than 10 points profit or loss. This exit attempts to close nonperforming trades so that capital

can be used for new entries.

System value: 0.75
Number of trades: 24
Win percentage: 46%
Average winner (points): 43.23

Average loser (points): -38.68
Profit (points): 49.9

This is the first system with an exit strategy based on some semblance of logic. That is, we are attempting to exit what can be termed nonperforming trades to access our capital for new opportunities. The average winner is now bigger than the average loser, and the system generates a modest profit. The system value is below 1.00, but positive. A more sophisticated approach would be to have a volatility-based measure of nonperformance that adapted to changes in volatility rather than a fixed parameter.

SYSTEM COMPARISON SUMMARY

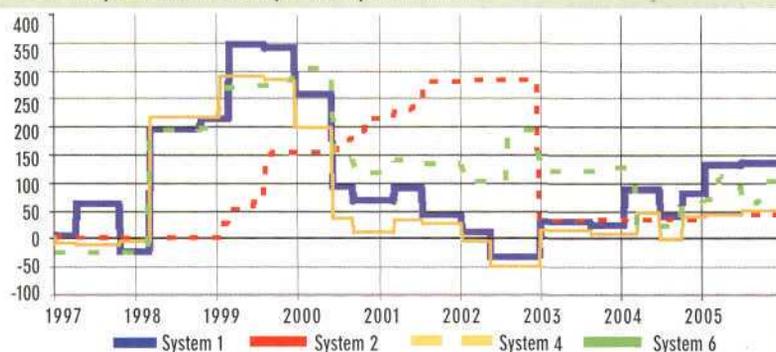
As we can see from the system value score for each system, the one with the complete set of exits has the best overall profit and a system value almost as good as System One, which has no exits to manage risk or protect profits.

System Number	System Value	Number of Trades	Win% Win%	Average Winner	Average Loser	Points Profit
1	1.67	21	52%	61.52	-54.18	134.99
2	0.73	22	77%	17.1	-249.13	41.5
3	-7.67	44	5%	311.42	-28.99	-594.6
4	0.75	24	46%	43.23	-38.68	49.9
5	-1.47	14	36%	84.33	-70.55	-213.52
6	1.49	26	62%	38.67	-47.8	140.74

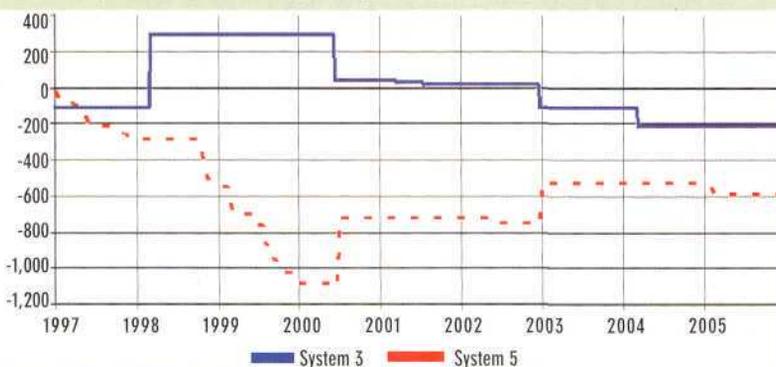
Sources: PMKing Trading LLC, Tradestation

POSITIVE, NEGATIVE

The chart below shows the simulated historical equity curves in cumulative points profit or loss for the systems that have a positive system value.



The chart below shows the simulated historical equity curves in cumulative points profit or loss for the systems that have a negative system value.



Source: PMKing Trading LLC

RISK MANAGEMENT EXIT

System Five has an additional risk management exit that is a simple stop based on the average true range (ATR) through the last 12 bars. This exit attempts to limit the size of losing trades by cutting losses short. It also has a 100-bar fixed exit for practical reasons.

System value: -1.47
Number of trades: 14
Win percentage: 36%
Average winner (points): 84.33
Average loser (points): -70.55
Profit (points): -213.32

This system has a stop loss that reduces risk. Therefore, some big winners that were large losers are no longer included. The average winner is still larger than the average loser, but the overall loss is bigger due to the decreased winning percentage. The number of trades has dropped because some trades that were exited at fixed intervals before are allowed to stay open as long as they are within the risk management stop.

This is an example where an exit reduces system performance because it is (necessarily) reducing risk. System value is now negative because risk has been limited but profits are not protected.

PROFIT PROTECTION EXIT

System Six has an additional profit pro-

tection trailing stop, which simply trails from the highest high for longs or lowest low for shorts after a certain profit target is reached. This exit attempts to protect some open profits from winning trades while giving them room to breathe.

System value: 1.49

Number of trades: 26

Win percentage: 62%

Average winner (points): 38.67

Average loser (points): -47.80

Profit (points): 140.74

The average winner is still smaller than the average loser, but the system is now profitable, and the results are less volatile. This is because the exits are working together to exit inactive positions, limit the size of losers and protect the profit on big winners.

The profit protection exit should be refined in conjunction with the other

exits to create a system where the average winner is greater than the average loser. This should also increase the system value. "System comparison summary" (left) provides a full comparison of all systems. Charts of hypothetical equity growth for each system are shown in "Positive, negative" (left).

EXIT ANALYSIS

By taking the same basic entry logic and historically testing it with different exit criteria we were able to observe the effect of each exit strategy on overall performance. The conclusion was that the system that had superior overall performance and risk management was the system that had a complete, but simple, set of exit criteria. System Six achieved this by including: Inactivity exits, risk management exits and profit protection exits.

Exits are what determine the main

performance characteristics of a system. Exits can be used to create high winning and losing percentages. Each system exhibits completely different characteristics even though the instrument traded, testing period and entry criteria were identical in each case.

From this, we can see that the majority of system development time should target exits. Exits, not entries, ultimately drive trading system profitability. 1 FBI

The code for the five exit systems plus the system five exit code with an additional trailing stop can be found on our Web site at www.futuresmag.com.

Paul King is a trader, trading coach and independent financial advisor. His company, PMKing Trading LLC is based in Vermont. This article was adapted from Paul King's first book, *The Complete Guide to Building a Successful Trading Business*. He can be reached at www.pmkingtrading.com.