Precision Money Management

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This article describes the model of a natural relationship between trading system performance, trade position size, stop loss settings and profit goals. The model consists of algebraic equations that specify the trade size and stop loss settings needed to meet profit goals over a specified time period for any consistently used trading system for which historical performance data is available.

Most of us think of a trailing stop loss when the term money management is mentioned. William O'Neil in his book, "How to Make Money in Stocks", used a value from 7 to 8%. Many stock advisories, including Stansberry and Associates, Outstanding Investments and the Oxford Club, typically use from 15 to 25% trailing stop losses. Option advisories use still higher values in the 35% range, as is done by Michael Lombardi, and up to as high as 50%, as used by Dr. Stephen Cooper. Trailing stops are typically used along with a maximum percentage of capital per trade to avoid large portfolio draw-downs in the event that a given trade goes badly. Beyond this precaution, there is little theory to explain how position size and trailing stop losses should be arrived at, leaving the impression that they can be arbitrarily chosen based on one's risk comfort level. However, this is not the case. Too narrow a stop loss setting can eat into profits by exiting volatile trades too early. Too wide a stop loss setting can eat into trading profits by consuming too much capital. A systematic way is needed to choose an optimum position size and stop loss setting to achieve a precise level of money management.

Intuitively, the higher the success rate in correctly choosing the direction of trade and the higher the average gain per trade, the looser one can afford to set his stop loss. However, when one has a specific earnings goal, this relationship needs to be more precise. Fortunately, the availability of consistent trading system performance data allows the use of an engineering approach. This approach enables us to define a very precise relationship between the average return for a series of trades, the percentage of correct choices in the direction of a trade, the size of each trade, profit goals and the appropriate stop loss settings.

The model introduced here for precision money management is based on average values of historical trading system performance and is only applicable when a trading system is consistently followed. The model should not be applied to unstructured trading across a variety of instruments requiring varying trading techniques. Each trading system or technique generates a unique set of statistics to which this methodology can be applied on an individual basis.

The model is derived based on fractional averages from information readily available to anyone that uses a trading system consistently. A pair of concise algebraic relationships evolves in the process. Finally, examples are provided to show the roles of position size and stop loss settings in meeting profit goals.

F_P is defined as the average fractional profit for all historical trades being taken into consideration. F_P is equal to the sum of the fractional gains and losses for all trades divided by the total number of trades N,

F_P = (sum of fractional gains + sum of fractional loses) / N

In order for this to be valid, each trade must involve very close to the same amount of capital that we will assign an average value C. For example, if there were 3 historical trades resulting in +25%, -15% and +30% gains, the average fractional profit would be (0.25 - 0.15 + 0.30)/3 = 0.133. Of course, a much larger statistically significant number of trades would be used in practice.

Since the sum of fractional gains is equal to the number of gains N_G times the average fractional gain F_G, and the sum of fractional loses is equal to the number of loses N_L times the average fractional loss F_L, the definition can be expressed as,

$$F_P = (N_G F_G + N_L F_L)/ N$$

It is understood that $N_G + N_L = N$. The value of N_G divided by N equals F_C, the fraction of trades chosen in the correct direction. N_L divided by N equals $(1 – F_C)$, the fraction of trades chosen in the wrong direction. So N divided into N_G and N_L leaves the following form.

$$F_P = F_C F_G + (1 – F_C) F_L \qquad (1)$$

Where,

F_P is the average fractional profit for N trades that each uses an average amount of capital C
F_C is the fraction of trades chosen in the correct direction
F_G is the average fractional gain for N_G winning trades
F_L is the average fractional loss for N_L losing trades

The fractional quantities can each be expressed individually as percentages but they should be expressed as decimal fractions in the equation.

In order to use equation (1), a profit goal must be established over a definite period of time. The profit per trade needed to meet a specific profit goal in a given amount of time depends on the number of promising trades likely to be identified by the trading system over that time period. The number of promising trades that become available within a given time period must be estimated judiciously because the last thing we want to do is force a trade under less than ideal conditions. In other words, we need to remain true to whatever system we are using.

For N trades each valued at an average capital amount C, the average fractional profit can also be defined by the total dollar profit goal D_G divided by the dollar sum of all N trades D_S,

$$F_P = D_G / D_S$$

Since D_S is equal to the average capital amount C times the number of trades N, this becomes,

$$F_P = D_G / (C N) \qquad (2)$$

Looking at equation (2), one can view the profit goal D_G as a simple multiple of the average capital per trade C because both D_G and C are considered constant for any given series of N trades. When the profit goal is set equal to the average amount of each trade, D_G and C both drop out of the equation and N becomes the number of trades needed to earn a profit equal to the average trade size. Equation (2) then becomes, $F_P = 1/N$.

More to the point, $N = 1/F_P$, an important conclusion. It says that ***the number of trades needed to earn an amount equal to the average trade size is $1/F_P$.***

A chart of $N = 1/F_P$ is plotted in Figure 1.

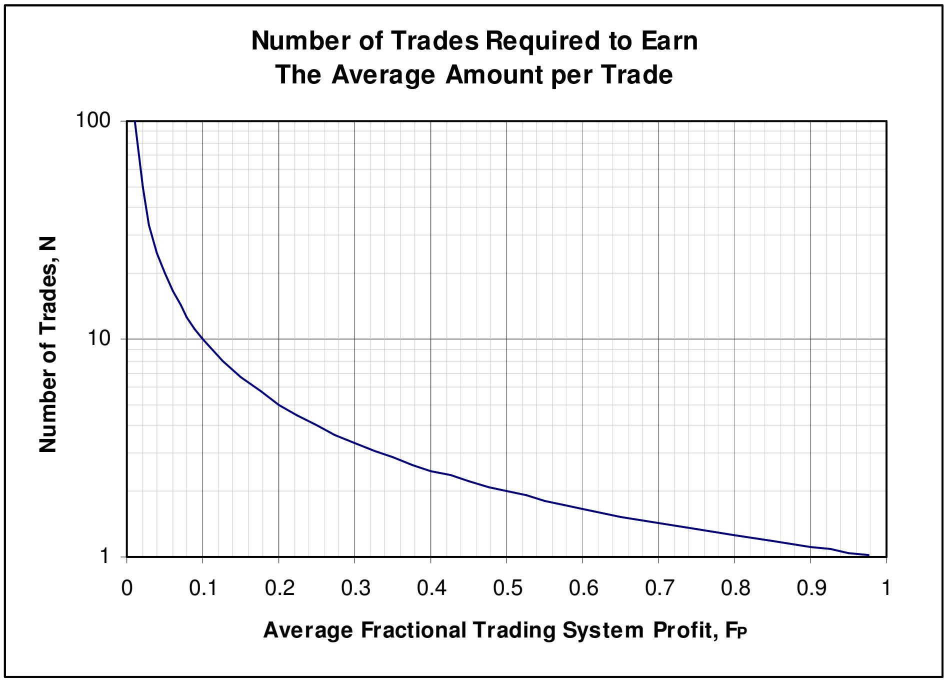

FIGURE 1

When the average number of trades is identified by a trading system over a fixed amount of time, the chart in Figure 1 gives the rate that C worth of profit can be obtained using a fixed average trading size C. The chart shows that when F_P is less than about 0.1, the number of trades required to earn the average traded amount grows exponentially. When a trading system's performance is improved by increasing F_P from 0.1 to 0.2, the number of required trades is cut in half from 10 to 5. An F_P of 0.5 requires approximately two trades. While increasing F_P above 0.5 may improve one's odds for success, it does not substantially reduce the number of required trades to meet a given profit goal. These details are useful and are based on the easiest trading system parameter to obtain, F_P, which defines overall trading system performance.

The average fractional gain per winning trade $\mathbf{F_G}$ can be treated as an expected profit value. Whenever profits exceed this level, it can only improve progress toward one's profit goal by increasing the average fractional profit per trade $\mathbf{F_P}$ and reducing the **N**, the number of trades needed to earn the average traded amount. This line of thinking concludes that profits should be taken whenever they significantly exceed the expected value of $\mathbf{F_G}$. To see what should be considered significant, refer to Figure 2.

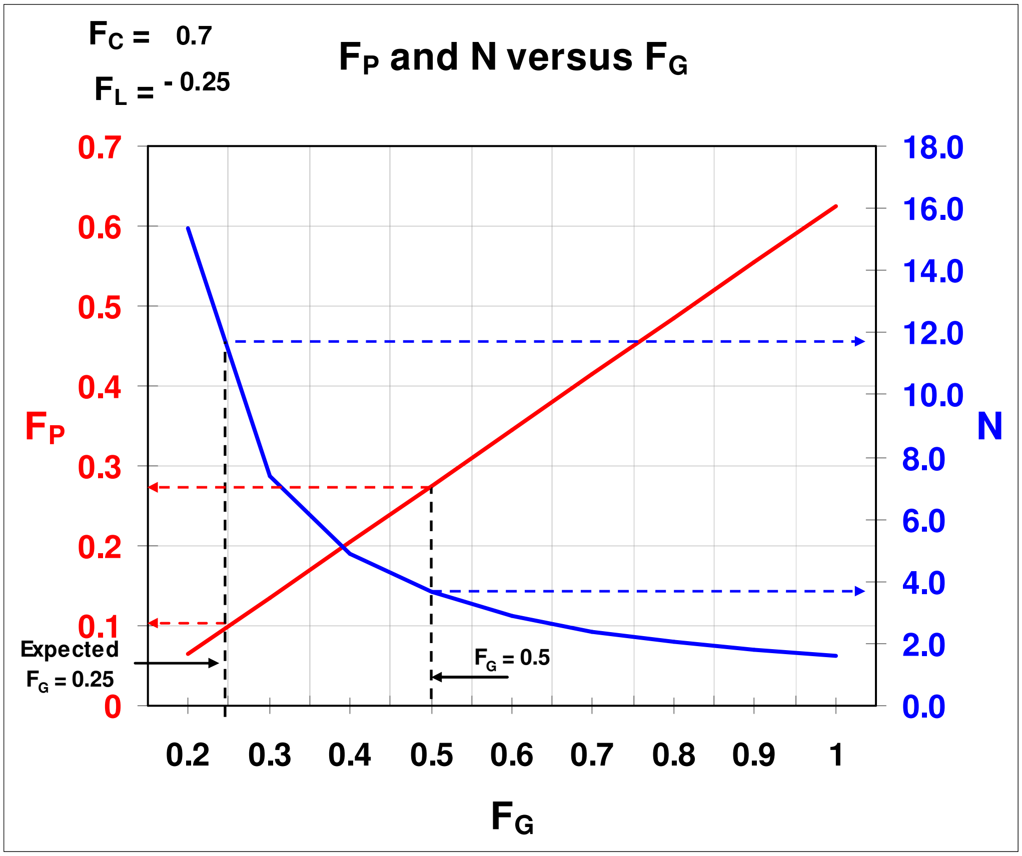

FIGURE 2
Effect of consistently increasing F_G, the average fractional gain per trade

Figure 2 shows how $\mathbf{F_P}$ and **N** are changed when $\mathbf{F_G}$ is doubled from an expected value of 25% to a value of 50%. $\mathbf{F_P}$ more than doubles and **N** is reduced by a factor of three! Reducing the number of trades needed to meet one's profit goals by a factor of three appears to be significant. One can use the chart to decide for himself what is significant.

Example 1:

Let us suppose that we have done a sufficient number of trades using our system to determine that the average fractional profit is 10%, the average gain per trade has been 29% and the fraction of times we chose the correct trading direction was 70%. Further let us set a goal to earn $3,000 per month. By our estimate, we figure that we can safely enter an average of 3 trades a week and remain within trading system guidelines. This equates to 3 trades per week times 4.33 weeks per month or an average of 13 trades per month.

Variables: $F_P = 0.1$
$N = 13$
$D_G = \$3{,}000$
$F_C = 0.7$
$F_G = 0.29$

Solving equation (2) for C gives us the average size of each trade,

$C = D_G / (F_P N) = \$3{,}000 / [(0.1)(13)] = \$2307.69$ for the average size of each trade

Rearranging equation (1), the average stop loss setting F_L must be,

$$F_L = (F_P - F_C F_G) / (1 - F_C)$$
$$= [0.1 - (0.7)(0.29)] / (1 - 0.7) = -0.3433 \text{ or } -34.33\%$$

Example 2:

Using essentially the same situation, we can look at what the effect of certain improvements in trading would have on the profits. Say we habitually exit winning trades too early and could possibly increase the average fractional gain F_G from 29% to 36%. From the same relationship used for example 1, the resulting stop loss setting F_L could then be widened to,

$$F_L = (F_P - F_C F_G) / (1 - F_C)$$
$$= [0.1 - (0.7)(0.36)] / (1 - 0.7) = -0.5066 \text{ or } -50.66\%$$

Example 3:

Let's suppose that for a series of potentially high yielding trades we know that an extra wide stop loss setting of -60% is needed and we want to know what the effect will be.

First we might want to look at the effect of a wider stop loss setting on profits with everything else remaining constant. We do this by equating the right sides of equations (1) and (2) and solving for D_G,

$$D_G = (C N) [F_C F_G + (1 - F_C) F_L] \quad (3)$$
$$= (\$2307.69)(13)[(0.7)(0.29) + (1 - 0.7)(-0.6)] = \$689.99$$

Clearly, our original monthly profit goal of \$3,000 can not be met without some additional changes, such as an increase in the number of trades from 13 to 57 over the month period. But this is not feasible since it was already estimated that the maximum number of trades identified by the trading system would be only 13 per month.

Example 4:

Next, since the trades in example 3 are believed to be potentially high yielding trades, we might look at the increase in the fractional gain per trade F_G needed to justify the wider stop loss setting of -60% and still meet the original profit goal. By rearranging equation (1),

$$F_G = [F_P - (1 - F_C) F_L] / F_C$$
$$= [0.1 - (1 - 0.7)(-0.6)] / 0.7 = 0.4 \text{ or } 40\%$$

So the average fractional gain for winning trades F_G would need to increase from 29% to 40% to justify a widening of the stop loss from -34.33% to -60%, keeping everything else the same while meeting the monthly profit goal.

The foregoing examples give insight into trading system characteristics that affect position size and stop loss settings. Narrow stop loss settings imply a smaller fraction of trades chosen in the correct direction or a smaller fractional gain for winning trades. Wider settings imply the opposite. Stop loss settings should not be arbitrarily set independently of position size, trading goals and trading system performance. Stop loss levels more or less define future profits for a given set of trading rules, whether the user realizes it or not. While it is laudable that traders are encouraged by their advisors to adopt money management, the recommendation of a specific stop loss value without knowing the profit goal and average position size can be misleading. When a trading system is used consistently, this model enables precise money management.

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