Managing Trade risk

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by Cynthia Kase

It may be obvious to most investors that they should not risk more than they can afford. It also may seem obvious that they can make such a decision by figuring out what they can afford–but that is not necessarily so. While an individual investor may have a good idea how much she is willing to lose on trading in the longer term, that does not necessarily translate into how much to risk in a given transaction.

Let's take the cases of Mary Smith and Bill Jones, each of whom has liquid assets of 1 million dollars. Each is willing to risk losing 10% of his or her portfolio, or $100,000 in active management of her account. Let's also assume that on average they risk $5,000 per trade each. Does this mean that they each have an equal chance of losing the $100,000?

Of course not. Assume Mary Smith studies the market and makes wise investments most of the time, making money on 60% of her decisions and losing on 40%. Assume Bill Jones goes by gut feel and likes to gamble, making money on 25% of his decisions and losing on 75%. Let's also assume that Mary Smith dispassionately watches her profits run, and makes an average of twice as much when she wins than when she losses. Conversely Bill Jones panics and often gets out too soon, averaging about the same on gains as on losses. In the long run odds are in favor of Mary Smith accumulating capital and Bill Jones losing all of his.

While 'portfolio risk' is a complex and challenging subject that keeps many Ph.D.'s in finance busy, most of us can use a simple 'risk of ruin' approach. Credit for my knowing about this technique goes to Merrill Oster, who wrote about it in the very early issue of *Commodities*–the precursor of *Futures*.

This is how it works. First we have to figure out how much of a chance we are willing to take of losing our $100,000. If we are willing to take only a 1% chance, then we have to be more conservative than an investor willing to take a 10% chance. Other inputs are the percent wins (how often we win), average wins (how much we gain when we make money) and the win to loss ratio (dollar amount average win to dollar amount average loss). Let's assume 60% and 2/1 as with Mary Smith above.

$$A = \frac{C}{(\ln P)/(\ln(1-W)-\ln WR)}$$

A = maximum dollar amount which can be risked on one trade

C = total amount of money we are willing to risk losing

Percent Wins Versus Thousands per Trade at Risk

Win/Loss Ratio	55%	60%	65%
1.00	4.4	8.8	13.4
1.50	13.2	17.6	22.2
2.00	19.4	23.9	28.5
2.50	24.3	28.7	33.3
3.00	28.2	32.7	37.3

(entire amount) in the long run

P = percent chance we are willing to risk of losing all of our risk capital

W = percent chance of winning a trade

R = ratio between amount of wins and amount of losses

Plugging in C at $100,000, P at 1%, W at 60% and R at 2, we find that Mary Smith can risk about $24,000 per trade.

If you are not sure what numbers to use, then be conservative. You need to assume values which make money over the long run, or else the formula will tell you to risk zero dollars. If we assume W is 55% and R is 1, then we can only risk about $4,300 per trade.

Once this is known, one can calculate the amount she 'can afford' to risk in a given trade, as explained below. (Professional traders wanting to include variations in performance and market conditions can write a simulation program in a spreadsheet add–in a program called @Risk based on the same idea.)

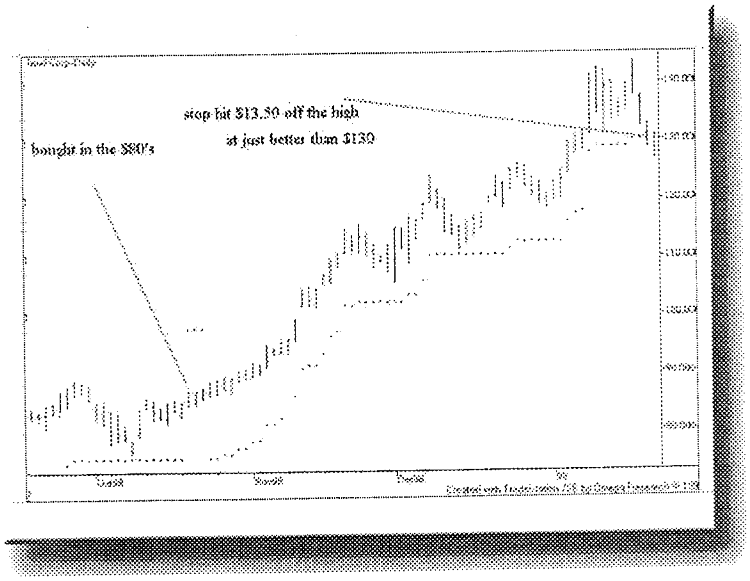
Managing Risk on Individual Investments

There are two methodologies by which we manage trade risk on individual instruments. The first is to exit trades on signs that an imminent turn may be 12222taking place. Experienced traders do this with the help of momentum indicators. Even so, these experienced traders need a 'safety net' in case there is no momentum signal, they miss the signal, etc. This second technique called "stops" is recommended for this purpose. For most investors, not yet familiar with concepts such as 'momentum divergence,' stops may be the only valid means they can use to exit trades.

Sometimes investors refer to the use of stops as "stop loss" but in fact, the use of stops also preserves profit. There are many types of stops such as 'fixed value from entry' or 'break–even' stops. When one is purchasing a stock or commodity, this means that the price at which you would exit is a fixed dollar amount below the entry point. The second is a stop which, once a certain profit is made, will only lose enough to break even. While these stops limit losses, they do not preserve profit. The most sensible style of stop for most investors is the trailing stop, or profit preservation stop.

This stop limits ones losses to a fixed amount relative to the best price since the purchase took place. If one bought Intel in the mid $80 range and put a $13.50 stop on the trade, the stop would have been 'hit' $13.50 off the high, at a little bit better than $130.

figure 1

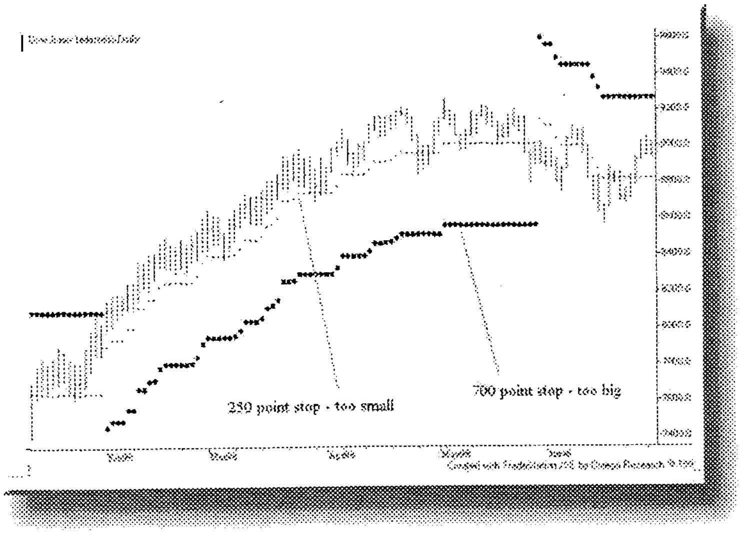


Intel With $13.50 Trailing Stop

We can see that, while the stop is threatened a few times, it does not stop out until a major change in trend. The question then arises as to how we chose the $13.50, and also, whether the value should ever change.

In this case, the $13.50 level was specifically chosen by the writer, after the fact, to fit the example perfectly. Many advisors will recommend investors place stops in accordance with an amount one can afford. Let's say one is holding 1000 shares of Intel and can afford to lose $13,500. Then one will set the stop at $13.50.

The difficulty is that the market does not care what one can afford. The key to setting stops properly is that the magnitude of the stop (the difference between the maximum profit point and the stop exit) should be large enough to keep us in the trade as long as it remains profitable, but small enough to kill the trade without giving back more than necessary. We call this "letting figure 2



your profits run while cutting your losses."

The probability that one's risk appetite–what one can afford–is consistent with a stop magnitude which will meet the optimal criteria is low.

Let's look again at investors Mary Smith and Bill Jones. Both are timing in and out of the Dow Jones Industrial Average. Both individuals are holding 10 contracts. Mary Smith is willing to risk $70,000 and Bill Jones $25,000. So they set stops at 700 and 250 points accordingly. The chart below shows that the Mary Smith's stop is too big and Bill Jones's too small.

Fixed Value Trailing Stop on DJIA

Stops, of course, work the same way on short positions. Given the great bull market most stocks have participated in, we had to turn to the energy sector (the writer's specialty on the commodity side) to find declining issues.

The next chart shows Halliburton and illustrates the same general idea. Let's assume both investor Mary Smith and Bill Jones are short 1000 shares. Mary Smith can afford to lose $3,000 and Bill Jones $10,000 and set their stops accordingly. Mary Smith's stop is again too small and Bill Jones's too large.

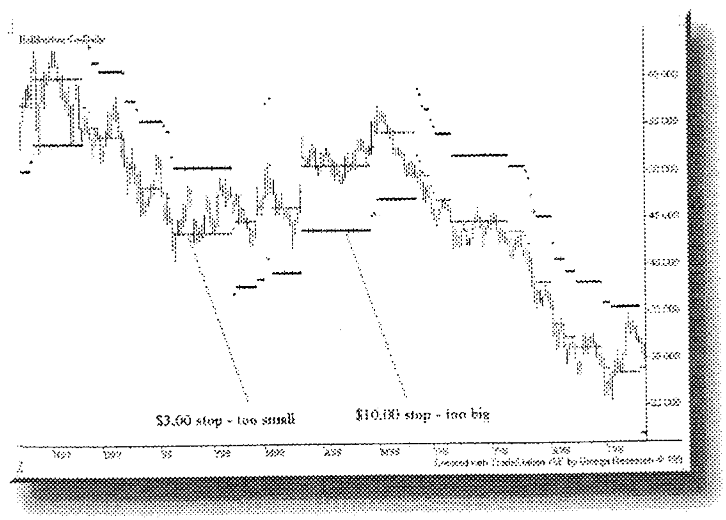
In addition, looking back at the two examples, we can see by inspection that in the first, Mary Smith's stop fit the data better and in the second Bill Jones's did.

Fixed Value Trailing Stop on Halliburton

Setting stops in accordance with what we can afford is better than not setting any stop at all and losing much more than one can afford. Nevertheless, it is our view that it is better to work backwards. First we determine the magnitude of a stop which will serve our objectives (let profits run, cut losses). Secondly, once we know how much risk we need to take per unit traded, then we can figure out the number of units we can afford to buy or sell.

The way we do this is by accounting for market volatility and the variance of volatility. This means we look at how much the market can move, on average, over a given time frame, say two or three days. We also look at how much variation there is from day to day. For example a market which moves an average of $10 per day, but often varies by $25 is more risky than another market which also averages $10 but rarely changes more than $13 in any given day.

figure 3

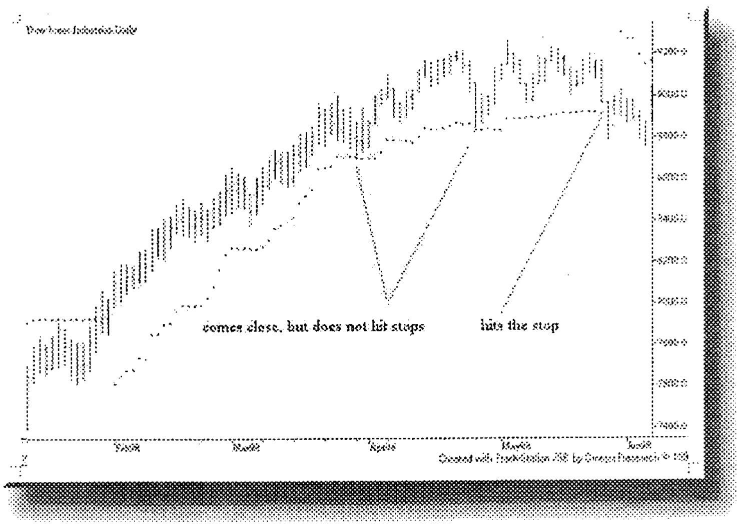


In addition to taking the factors noted above under consideration, it is a good idea to use a stop which will adapt to changes in the factors. For example, let's say I bought a volatile tech stock which had risen an average of $10 per day for months. Then the market quieted down and began to trade sideways, with a range of $5 per day. Everything else being equal, an adverse two day move is of a smaller magnitude now than in the bull run. Therefore, my stop should be smaller as well.

To solve this problem, we calculate the two key factors we noted above: the volatility and variance of volatility. Before we look at the math, let's look at how the stop–called the Kase DevStop–works. The chart below (Figure 3) shows the same run on the Dow Jones Industrial Average that we reviewed above.

Here we show a stop designed to exit on a 99.7% probability that the turn will be significant enough to justify taking profit or cutting losses.

figure 4



DJIA With the Kase DevStop (at 99.7% probability)

Note that on two of the more shallow corrections, the market came close to, but did not break the stops. Only when the market entered a more complex correction, which had two legs down of about equal magnitude, did the stop get us out of the trade. These stops, unlike the first one we examined, are computer generated, not set by hindsight.

When using such a stop, the investor knows ahead of time the magnitude of the stop called for by the market. Let's assume that the stop magnitude on the day investor Mary Smith discussed above entered the trade was 400 points, or $4,000 per contract traded. Remember Mary Smith, going back to our original example, can risk about $24,000 per trade, so she can trade six contracts.

When calculating our stop, we use a simplified proxy for volatility called the true range. The true range is very similar to the bar height–the high of the day less the low of the day–except that it takes into consideration gaps between days. The mathematical formula for this measurement is:

True Range = @Max ((h–l), (l–c[previous]), (c[previous–high)

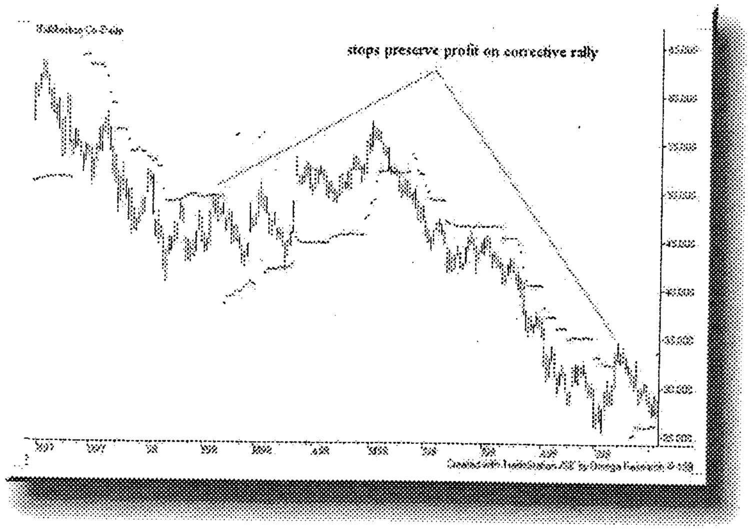
In our practice, we use a two day range. The math, which is a bit more complex, is set forth in my book and numerous articles I have written.

The average 'volatility' is the average of the true range. We use the average of the true range over a default period of 30 days (bars). The variation in the volatility is approximated by taking the standard deviation of the true range.

As a finishing touch, we add a correction to account for the fact that the distribution of the ranges is 'skewed to the right.' The range of any given day cannot be less than zero, but sometimes volatility can 'spike' up. As a result, the actual distribution approximates a shape called 'log normal.' If it were not for this factor we could set our stops with absolute certainty. Unfortunately, the degree of skew is unstable. To put it differently–the degree of skew is skewed ad infinitim. So we must make an estimate of the degree of skew and live with this minor degree of imperfection. For futures we raise the third standard deviation by 20%, for indices around 25%, and for individual stocks from 25 to 33%.

An additional advantage of this approach is that at a given number of standard deviations over the mean, we can know the probability of a stop being hit. If we set the stop, for example, at 2 standard deviations over the mean (corrected for skew), based on a two day reversal, then the stop will be hit on 2.5% of such reversals.

The same approach is used on the Halliburton shares, in a bearish decline, as discussed above. Again these computer generated stops, which averaged around $5.00, held the figure 5



investor in the short trade during the major portion of the decline, and allowed her to take profit during the corrective rallies.

So, we see that our computer generated Kase DevStops can be used to keep us in running trades and to get out when justified.

Traders who wish to take less risk will get stopped out on more minor bumps in the market. For example, a stop at the 85% probability level only risks $3.00. The price one pays for taking less risk is one must market more closely to time in and out more often.

Halliburton With the Kase DevStop (at 99.7% probability)

Conversely, those wishing to be much more passive than our stops suggest, must pay by taking increased risk. For example, rather than running the stops on a daily chart, one could use a weekly. In this case, in order to sit through the major reversal in the first four months of the year, one would have had to risk three times as much.

So, if trading Halliburton as shown above with about $5.00 risk per share, Mary Smith can trade $24,000/$5, or about 4800 shares. Along the same lines, if Mary Smith decided to be a more passive investor, managing her risk on a weekly basis with fluctuations in the range of $15 per share, she could then trade only 1600 shares.

In conclusion, we now have the computer number crunching capability to determine the amount of risk which the market imposes upon us as traders. We have gained the understanding of how to use stops dictated by market structure, as opposed to our own emotional bias. We can decrease either time frame or trading volume to reduce risk–as opposed to stop magnitude. In this way we can get as close as statistically possible to the optimal balance of truly allowing profits to run and cutting losses. The result is that we, everything else being equal, will optimize the profit to loss ratio and improve our trading results.