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## **The Matrix: Risk/Reward and The Probability of Ruin**

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### **Risk and Money Management**

Managing one's risk and capital is undoubtedly the two most important, yet among novices the most ignored, tasks in establishing long term trading success. To drive this point home, we will introduce this topic by quoting some of the true masters, from the books [The New Market Wizards](#) and [Market Wizards: Interviews With Top Traders](#).

*"[Michael Marcus - another top trader] taught me one other thing that is absolutely critical: You have to be willing to make mistakes regularly; there is nothing wrong with it. Michael taught me about making your best judgement, being wrong, making your next best judgement, being wrong, making your third best judgement, and then doubling your money."* - **Bruce Kovner**

*"You should always have a worst case point. The only choice should be to get out quicker."* - **Richard Dennis**

*"95 percent of my profits have come from 5 percent of my trades."* - **Richard Dennis**

*"That cotton trade was almost the deal breaker for me. It was at that point that I said, 'Mr. Stupid, why **risk** everything on one trade? Why not make your life a pursuit of happiness rather than pain?'"* - **Paul Tudor Jones**

*"If I have positions going against me, I get right out; if they are going for me, I keep them... **Risk control** is the most important thing in trading. If you have a losing position that is making you uncomfortable, the solution is very simple: Get out, because you can always get back in."* - **Paul Tudor Jones**

*"Don't focus on making money; focus on protecting what you have."* - **Paul Tudor Jones**

*"The elements of good trading are: (1) cutting losses, (2) cutting losses, and (3) cutting losses. If you can follow these three rules, you may have a chance."* - **Ed Seykota**

*"Throughout my financial career, I have continually witnessed examples of other people that I have known being ruined by a failure to respect **risk**. If you don't take a hard look at **risk**, it will take you."* - **Larry Hite**

*"Frankly, I don't see markets; I see **risks**, rewards, and money."* - **Larry Hite**

*"My philosophy is that all stocks are bad. There are no good stocks unless they go up in price. If they go down instead, you have to cut your losses fast... Letting losses run is the most serious mistake made by most investors."* - **William O'Neil**

*"When I became a winner, I said, 'I figured it out, but if I'm wrong, I'm getting the hell out, because I want to save my money and go on to the next trade.'" - **Marty Schwartz***

*"Learn to take losses. The most important thing in making money is not letting your losses get out of hand." - **Marty Schwartz***

*"I realized that this chipping away approach was what I should be doing, not putting myself at a big **risk**, trying to collect a ton of dough." - **Tony Saliba***

*"I always define my **risk**, and I don't have to worry about it." - **Tony Saliba***

*"When I get hurt in the market, I get the hell out. It doesn't matter at all where the market is trading. I just get out, because I believe that once you're hurt in the market, your decisions are going to be far less objective than they are when you're doing well... If you stick around when the market is severely against you, sooner or later they are going to carry you out." - **Randy McKay***

*"I'll keep reducing my trading size as long as I'm losing... My money management techniques are extremely conservative. I never **risk** anything approaching the total amount of money in my account, let alone my total funds." - **Randy McKay***

Quotations from Richard Dennis's partner [William Eckhardt](#)

*"The key to trading success is emotional discipline. If intelligence were the key, there would be a lot more people making money trading... I know this will sound like a cliché, but the single most important reason that people lose money in the financial markets is that they don't cut their losses short." - **Victor Sperandeo***

*"I think investment psychology is by far the more important element, followed by **risk control**, with the least important consideration being the question of where you buy and sell." - **Tom Basso***

*"Never fear making a mistake. If you do make a mistake, don't complicate the position by trying to hedge it - just get out." - **Linda Bradford Raschke***

*"I think it's generally a good idea that when you put on a trade, it should be so small that it seems almost a waste of your time. Always trade at a level that seems too small." - **Mark Ritchie***

### **Bet Size and Market Mortality**

Imagine if you had a trading system that made correct market calls 99% of the time, and each trade that you made would double your bet if you won, or, if you lost, you would lose what you bet. One would think that your success in the markets was virtually guaranteed. But what if you bet 100% of your capital on every trade? If you did this, chances are that you would initially multiply your capital extremely quickly, but sooner or later you would be wiped out on the 1% probability that your trading system made a bad call.

## **Right is not Might**

As a slightly less extreme example, suppose that your trading system could still win 99% of the time. Now for each win, you would receive one unit, say \$1. For each loss, however, you would lose \$110. You could probably trade this way for a long time and impress everybody by your consistent profitability. However, eventually a very large loss would wipe you out of the game. This situation is actually similar to many real life financial debacles. One example would be the collapse of the Lloyd's of London insurance syndicates. Another would be the wipeout of the hedge fund Long Term Capital Management. Both institutions had years of strong and steady profits, but were blown up by rare, but extremely large losses.

## **Be Wrong Often and Make Money**

In contrast to these situations, many professional traders continually pull money out of the market, but they win on far fewer than 50% of their trades. This is sometimes difficult for novice traders to accept, for in our formative years at school, a performance of less than 50% meant failure. But we must discard such notions when we decide to speculate intelligently. The best traders have given up on the notion that they must be correct all of the time. Rather, they try to maximize their winnings when they are correct, and minimize their losses when they are wrong.

In summary, "being correct on the market" and "building wealth" are not synonymous. In order to get from your market forecast to an increase in the value of your account, you must optimally employ your capital. That is what risk management is all about.

## **"The Matrix" is Not Just a Sci-Fi Thriller**

Risk management is more important to long term success than market prediction, and fortunately, correct risk management procedures are far easier to develop than are successful market forecasting techniques. A beginning trader should use only a few simple technical indicators and concentrate on correct risk management, rather than engaging in a futile search for the elusive (actually non-existent) techniques that will predict the market with pinpoint accuracy.

## **The Basics of Proper Risk Management**

There are two critical issues that every prospective trader should understand *before* speculating with real money: trade expectation, and the probability of ruin.

### **Trade Expectation - Should One Even Bother to Trade?**

A trader's calculation of his trade expectation tells him whether or not he should even be trading. Trade expectation is also called the "average trade." For example, if you make 20 trades and make \$10,000 net profit, then your average trade is \$500. If several different traders all make \$10,000 in 20 trades using completely different techniques and markets, the average trade will still be the same: \$500. To calculate your future trade expectation, you need four values: the percentage of your trades that you win, the percentage of your trades that lose, the average amount of money you win for a typical winning trade, and the average amount of money that you lose on a losing trade.

The formula is:

$$\textbf{Average Trade} = [(\text{Win \%}) \times (\text{Average Win})] - [(\text{Lose \%}) \times (\text{Average Loss})]$$

An attentive reader might logically ask: "Don't you just need two values: the total amount won or lost, and the number of trades?" This is true if all you want is just to get the raw Trade Expectation value, but using the four-input formula allows for a greater self-analysis of your trading. You can change the win/loss amount or the percentage wins/losses and see how this would affect your results.

If your average trade value is negative, you should expect to lose money in the future while trading, if the size of your wins and losses, and the percentage of winners you get, remain unchanged into the future. How accurate is it to extrapolate like this? It depends on the number of trades in your sample. For instance, if your sample only has five trades, it would be unrealistic to generate statistics on those five trades. Statistical theory states that for most types of phenomena, you need about 30 events in your sample to get reasonably accurate statistics. However, market movements are not what a statistician would call "normally distributed." This means that you need more than 30 trades to get an accurate idea of what will happen in the future. I would suggest at least one hundred trades, if not more. Therefore, if you have a trading method that enters and exits a market twice every week, you need about a year's worth of trading to get 100 trades. You can get the data on your 100 trades by:

- a. Actual Trading - the best method
- b. Paper Trading - good but often overestimates the results
- c. Historical Trading System testing - not as good as paper trading for accuracy & realism

One other problem with extrapolating trading results into the future is that market conditions might change. The obvious example is a stock trading method that has been designed during a bull market. Flaws with the system may become apparent only when the market trend changes to neutral or bearish. The only way to deal with this problem is to be honest with yourself when you are designing a trading method and not to be overcome with greed. Ask: "Has my experience with this trading method been taken through the many different types of market conditions that could happen in the future?"

### **The Adventures of Trader J. Doe**

Assuming you have a decent sized sample of trades, you can use The Matrix Spreadsheet to analyze your results:

Example: Typical novice trader. Wants to win on every trade. Takes small profits but lets losses get out of hand.

Average Win=\$1,000

Average Loss=\$2,000

***Needs to win at least 66% to just break even.***

Questions:	How big is your average loss (your risk per trade)?	\$2,000
	What is the ratio of size of winners to losses?	0.5
	Transaction costs (dollars)?	\$0

  

Win Pct	Ave. Win/Loss In Dollars
30	\$1100.00
35	\$950.00
40	\$800.00
45	\$650.00
50	\$500.00
55	\$350.00
60	\$200.00
65	\$50.00
70	\$100.00
75	\$250.00
80	\$400.00

  

If "your numbers" are negative, you need to:

- increase the size of wins to losses (let profits run)
- increase the number of winners (buy low/sell high)!

Even if a trader has a stop loss on every position and limits the losses on every trade that goes against him, there is always a possibility that a series of losing trades could take him out of the game. Suppose Trader Doe decides to try his hand at futures and starts trading a single S&P 500 futures contract with \$50,000 in capital. He will have to stop trading if his capital dwindles to \$20,000 because his broker will tell him that he is close to the margin limit. If he limits his losses to \$2,000 per trade, then there is always a possibility, though seemingly remote, that he could have a streak of losses, or a series of streaks, that would reduce his capital to the point where he would have to stop trading.

1. The "starting point", that is, the beginning account size: \$50,000
2. The "failure point" where he must stop trading: \$20,000
3. The "success point", Trader Joe's goal: \$100,000



He also needs to know his average win/loss size and percentage of wins. With these numbers he can use the formula programmed into The Matrix Spreadsheet to find out how realistic his ideas are by way of the Probability of Ruin calculations.

His experience with his *practice* S&P trading method suggests that he will win 45% of the time, with an average loss of \$2,000 and an average win of \$3,000. He looks at the correct row and column in the POR Matrix below and it gives a probability of 9% that he will hit "failure" before he hits "success." This is only in theory. In reality, most discretionary traders would begin to take on riskier trades out of desperation as their capital dwindled. Therefore, if Trader Doe gets sloppy after a string of bad trades, and slips to a 40% batting average, his risk of ruin rises dramatically to 62%. Changing the parameter values in other ways will change the probability values in the matrix. For example, making the "success" amount smaller will reduce the probability of ruin, because "success" has been made easier to achieve.

Please input the following values:									
Average Loss:		\$2,000				Each cell calculates:		eg:	
Starting Account:		\$50,000				a) Probability of Ruin		x%	
What is "Success"?		\$100,000				b) Average Trade (Expectation)		\$\$\$	
What is "Failure"?		\$20,000							
* Note: "Failure" must be less than "Starting Account" and "Starting Account" must be less than "Success"									
Average	Percentage of Winning Trades								
Win	30%	35%	40%	45%	50%	55%	60%	65%	70%
	100%	100%	100%	100%	100%	100%	100%	93%	4%
\$1,000	-\$1,100	-\$950	-\$800	-\$650	-\$500	-\$350	-\$200	-\$50	\$100
	100%	100%	100%	100%	100%	93%	13%	0%	0%
\$1,500	-\$950	-\$775	-\$600	-\$425	-\$250	-\$75	\$100	\$275	\$450
	100%	100%	100%	99%	62%	5%	0%	0%	0%
\$2,000	-\$800	-\$600	-\$400	-\$200	\$0	\$200	\$400	\$600	\$800
	100%	99%	62%	9%	1%	0%	0%	0%	0%
\$3,000	-\$600	-\$250	\$0	\$250	\$500	\$750	\$1,000	\$1,250	\$1,500
	94%	40%	6%	1%	0%	0%	0%	0%	0%
\$4,000	-\$200	\$100	\$400	\$700	\$1,000	\$1,300	\$1,600	\$1,900	\$2,200
	44%	9%	2%	0%	0%	0%	0%	0%	0%
\$5,000	\$100	\$450	\$800	\$1,150	\$1,500	\$1,850	\$2,200	\$2,550	\$2,900
	16%	4%	1%	0%	0%	0%	0%	0%	0%
\$6,000	\$400	\$800	\$1,200	\$1,600	\$2,000	\$2,400	\$2,800	\$3,200	\$3,600
	9%	3%	1%	0%	0%	0%	0%	0%	0%
\$7,000	\$700	\$1,150	\$1,600	\$2,050	\$2,500	\$2,950	\$3,400	\$3,850	\$4,300
	6%	2%	1%	1%	0%	0%	0%	0%	0%
\$8,000	\$1,000	\$1,500	\$2,000	\$2,500	\$3,000	\$3,500	\$4,000	\$4,500	\$5,000

Only the individual trader can decide whether the risk is worth the reward, given the odds of achieving his goal. A very conservative trader might wish to have a probability of ruin very close to 0%, whereas an aggressive trader might be able to sleep comfortably at night with a POR of 20% or more.

<b>Please input the following values:</b>									
Average Loss:		\$1,000			Each cell calculates:				eg:
Starting Account:		\$5,000			a) Probability of Ruin				x%
What is "Success"?		\$10,000			b) Average Trade (Expectation)				\$\$\$
What is "Failure"?		\$0							
* Note: "Failure" must be less than "Starting Account" and "Starting Account" must be less than "Success"									

  

Average Win	Percentage of Winning Trades								
	30%	35%	40%	45%	50%	55%	60%	65%	70%
	100%	100%	100%	99%	98%	95%	86%	62%	26%
\$500	-\$550	-\$475	-\$400	-\$325	-\$250	-\$175	-\$100	-\$25	\$50
	100%	99%	98%	94%	83%	62%	34%	13%	3%
\$750	-\$475	-\$388	-\$300	-\$213	-\$125	-\$37	\$50	\$138	\$225
	99%	96%	88%	73%	50%	27%	12%	4%	1%
\$1,000	-\$400	-\$300	-\$200	-\$100	\$0	\$100	\$200	\$300	\$400
	86%	71%	50%	31%	17%	9%	5%	2%	1%
\$1,500	-\$250	-\$125	\$0	\$125	\$250	\$375	\$500	\$625	\$750
	63%	44%	29%	18%	11%	7%	4%	3%	2%
\$2,000	-\$100	\$50	\$200	\$350	\$500	\$650	\$800	\$950	\$1,100
	45%	31%	21%	15%	10%	7%	5%	3%	2%
\$2,500	\$50	\$225	\$400	\$575	\$750	\$925	\$1,100	\$1,275	\$1,450
	36%	26%	19%	14%	10%	8%	6%	4%	3%
\$3,000	\$200	\$400	\$600	\$800	\$1,000	\$1,200	\$1,400	\$1,600	\$1,800
	31%	23%	18%	14%	11%	9%	7%	6%	4%
\$3,500	\$350	\$575	\$800	\$1,025	\$1,250	\$1,475	\$1,700	\$1,925	\$2,150
	28%	22%	18%	15%	12%	10%	9%	7%	6%
\$4,000	\$500	\$750	\$1,000	\$1,250	\$1,500	\$1,750	\$2,000	\$2,250	\$2,500

The POR calculation helps to illustrate why undercapitalized traders often fail. Take the typical wannabe Net stock trader who opens an online brokerage account with \$5,000 and starts trading 200 shares of their favorite "dot.com" stock with a \$5 stop loss. They are actually better off than most traders who would not even use a stop loss. A quick glance at the corresponding POR Matrix above shows that unless the trader's skills are exceptional, the risk of ruin is very high. In practice, ruin is virtually guaranteed. This is why risk and money management is everything in the world of trading.