



Position Sizing - Vol 1

Introduction

Proper position sizing is arguably the single most important aspect of investing and trading. A good strategy that uses poor position sizing will undoubtedly lead to financial ruin, while a poor strategy that uses good position sizing will likely underperform at a much slower rate.

Position sizing serves as the cornerstone of financial risk-management. Many of the financial crises witnessed over the past 3 decades were not the result of poor investment strategy, but rather of an underestimated appreciation of potential volatility and the liberal use of leverage.

There have been dozens of books written on the subject of position sizing and I encourage everyone to browse through some of these to understand the basics. In this paper we will simply look at a few approaches and reacquaint ourselves with some fundamental concepts.

The first is the notion of the Maximum Acceptable Loss (MAL) per trade, which is usually expressed as a percentage of capital. General wisdom often says that a trader should not risk more than 2% on any one short-term trade. This value is sometimes increased to 5% for longer "position" type trades. The idea behind the MAL is that betting the farm on any one trade could yield catastrophic results, reminding us that capital preservation is the key to long-term trading success.

The second concept is that of the Maximum Acceptable Drawdown (MADD), also expressed as a % of capital. This is the level at which the trader will want to pull the plug on a strategy that has lost more than it was statistically modeled to lose. The numbers will vary considerably here. Private investors will typically tolerate very high MADD levels of 50% or more, mainly because they often cannot "afford" to close their positions during severe drawdown periods, preferring to hunker down and hope for better times to come. Fund managers tend to have their MADD level dictated to them by their clients, who will vote with their feet if the fund drops more than say 25 or 30% from highs. Short-term traders tend to be the most risk-averse and will likely call it quits at a MADD level of 20% or less.

Below are a few examples illustrating the concepts of MAL and MADD.

Example 1 - Single Trade: Fixed Position Size

In this first example, the trader decides to use a fixed MAL level of 2% and a position size of 100% of his \$100,000 trading capital on any one trade. This, by definition, means that he'll need to set his stop loss 2% below his entry point, as shown below:

Trade inputs:

- Capital: \$100,000
- Position size: 100%
- MAL/trade (%): 2%

Equity trade Example:

- Entry long at: \$50.00
- Share number: 2000
- Stop loss at: \$49.00



Comments:

- This very simple approach (fixed position size & fixed MAL) makes it extremely easy to determine the stop level. In this case, the 2% MAL applied to a \$50 entry point would result in a \$49 stop loss.
- The issue though is that the trader must avoid any trades where the % difference between the entry level and the stop loss is greater than the MAL.

Example 2 - Single Trade: Variable Position Size

In this second example, the trader determines that a variable stop level is needed to get the most out of his strategy. In some instances the trade may call for a small stop, in others for a larger stop. So to respect the same 2% MAL level for every trade, the trader will need to adjust his position size accordingly. Below is the example using a \$48 rather than a \$49 stop:

Trade inputs:

- Capital: \$100,000
- Position size: 50%
- MAL/trade (%): 2%

Equity trade Example:

- Entry long at: \$50.00
- Share number: 1000
- Stop loss at: \$48.00

Comments:

- Here a varying stop loss level and a fixed MAL/trade (2%) are used to calculate the position size for the trade.
- The main advantage of this approach is that no trades need to be avoided. If the strategy calls for varying stop loss levels (e.g. based on volatility levels), then the trader simply adjusts the size of his position accordingly.

Example 3 - Multiple Trades: using MAL to determine MADD

In this third example, the trader uses his standard 2% MAL over a great number of trades. Now, assuming his strategy has an historical average win rate of 60% and trades on average 10 times/day, we can calculate the average time it would take for the strategy to hit any one maximum acceptable drawdown (MADD) level, as per the table below:

MAL / trade	Win Rate	Consecutive Losses	MADD	Probability %	Trades / Day	Trades / Year	MADD Frequency
2 %	60 %	5	10 %	1.0240 %	10	2500	0.04 years
2 %	60 %	10	20 %	0.0105 %	10	2500	3.8 years
2 %	60 %	15	30 %	0.0001 %	10	2500	372 years

So, assuming that the trader's MADD tolerance is 20%, then the strategy is likely to hit this level, on average, every 3.8 years.

Trade inputs:

- Capital: \$100,000
- Position size: 100%
- MAL/trade (%): 2%
- MADD (%): 20%



Strategy Characteristics:

- Historical win rate: 60%
- Trades / day: 10
- Avg MADD level hit: 3.8 years

Comments:

- Looking at the table above we can see that the probability of the strategy reaching a 30% drawdown level is extremely remote: on average, once every 372 years. However, the likelihood of it hitting 20% is considerably higher (every 3.8 years), and of it hitting 10% is extremely high (every 10 days or so).
- Understanding these statistics is essential in determining whether a strategy is performing in line with normal historical norms, or not. So for example, if the strategy were to hit the 10% drawdown level more frequently on average than once every 10 days, then the trader would need to question the integrity of his strategy development process.

Example 4 - Multiple Trades: using MADD to determine MAL

In this fourth example, our trader is still using the strategy described in example 3. However, he has decided that a 3.8 year average time to reach a MADD number of 20% is just too short. In order to extend this MADD frequency, he needs to work backwards, as shown in the table below:

MAL / trade	Win Rate	Consecutive Losses	MADD	Probability %	Trades / Day	Trades / Year	MADD Frequency
1.4 %	60 %	14.3	20 %	0.0002 %	10	2500	196 years
1.5 %	60 %	13.3	20 %	0.0005 %	10	2500	81 years
1.6 %	60 %	12.5	20 %	0.0010 %	10	2500	38 years

So, assuming the trader determines that, on average, once every 81 years (i.e. "once in a lifetime") is an acceptable frequency for his strategy to hit the 20% MADD threshold, then he'd need to lower his MAL/trade figure from 2% to 1.5%.

Trade inputs:

- Capital: \$100,000
- Position size: 100%
- MAL/trade (%): 1.5%
- MADD (%): 20%

Strategy Characteristics:

- Historical win rate: 60%
- Trades / day: 10
- Avg MADD hit: 81 years

Comments:

- Deriving a MAL figure from a predetermined average MADD frequency gives the trader control over the likelihood that his strategy will experience a sizeable drawdown.
- Note that in this example, the resulting MAL/trade figure of 1.5% would limit the trader to trades that use a 1.5% or lower stop loss. If a greater stop is needed, the trader would simply lower the size of his position accordingly, as in example 2.



Summary

- Position-sizing is probably the most important issue that traders have to deal with. A simplistic approach based on MAL/trade only is likely to end in financial disaster.
- For any one individual trade, changing position size is the only way not to miss out on trades requiring greater stop losses (volatility-adjusted strategies, etc).
- The laws of probability dictate that any trading strategy with a win rate lower than 100% will eventually suffer a long string of consecutive losers, resulting in substantial capital drawdown. The only question is when. Trading is all about lowering the likelihood and frequency of these black swan events.
- Analyzing the long-term effect of selecting any one MAL/trade should be done within the context of the strategy's historical trade statistics. Understanding how small changes in the performance data (average win rate, trade frequency, profit factor, etc) can impact the long-term robustness of the system is essential to gain the confidence needed to trade the strategy consistently, through both good times and bad.