Lake Hill
CAPITAL MANAGEMENT
lakehillgroup.com 150 East 58th Street 25th Floor New York, NY 10155 212-792-6672

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> ***"Expect everything so that nothing comes unexpected."***
> ***— Norton Juster***

An investment professional recently told me that he only invests in businesses with a Sharpe ratio greater than 1.0. Additionally, he cuts his capital allocation if a fund has a drawdown greater than 5%. Unfortunately, even with his unique ability to find great managers and a strict drawdown control, he was losing money. Why?

His drawdown risk control is mismatched with the Sharpe ratio hurdle. He was cutting positions far too soon. While attempting to "let his profits run and cut his losses short," he was inadvertently allowing for neither.

Most investors are very excited about any business that targets 30% annual return with a Sharpe ratio of 1.0 as it far exceeds the benchmark averages. Given such a business, what are reasonable expectations for downside risk? What is the expected annual drawdown? How many months per year is it expected to lose?

The answers may be surprising:

We simulate year-long samples and analyze the resulting data.[1] This gives an indication of what to expect as a base case. The results show the following return characteristics:

Expected number of down months per year	**4.6**
Probability of 3 or more down months per year	**90%**
Expected number of drawdowns worse than 10% per year	**2.2**
Estimated annual drawdown amount per year	**-25.6%**

Figure 1: Data are calculated using 50,000 simulations of 252 trading days (i.e. year-long samples). The expected annual return is 30% with an annual standard deviation of 30% (i.e. a Sharpe ratio of 1.0 assuming a 0% risk-free rate). Cumulative return data computed using simple returns (i.e. fixed booksize without compounding). Drawdowns are calculated at a daily (not monthly) frequency.

[1] The simulation assumes the data is drawn from a normal distribution, however, most strategies have return distributions that are not normal. Instead, they tend to be negatively skewed with fat tails. The statistics for such distributions often result in even deeper and longer drawdowns.

A strategy with a Sharpe ratio of 1.0, targeting 30% return, is expected to have more than four down months and a -25.6% drawdown in any given year. This is just a base case expectation. It could certainly be down more than four months and have a deeper drawdown.

Not knowing these figures in advance could result in a terrible outcome for both the investor and the manager. The investor or manager could be too quick to pull money or cut positions because the expectations were misaligned or not understood.

We can calibrate any drawdown expectations in advance if we fix the target returns but allow the Sharpe ratio (and thus the volatility) to vary. The chart below illustrates the expected worst drawdowns per year for investments targeting either a 10%, 20% or 30% return with different Sharpe ratios.

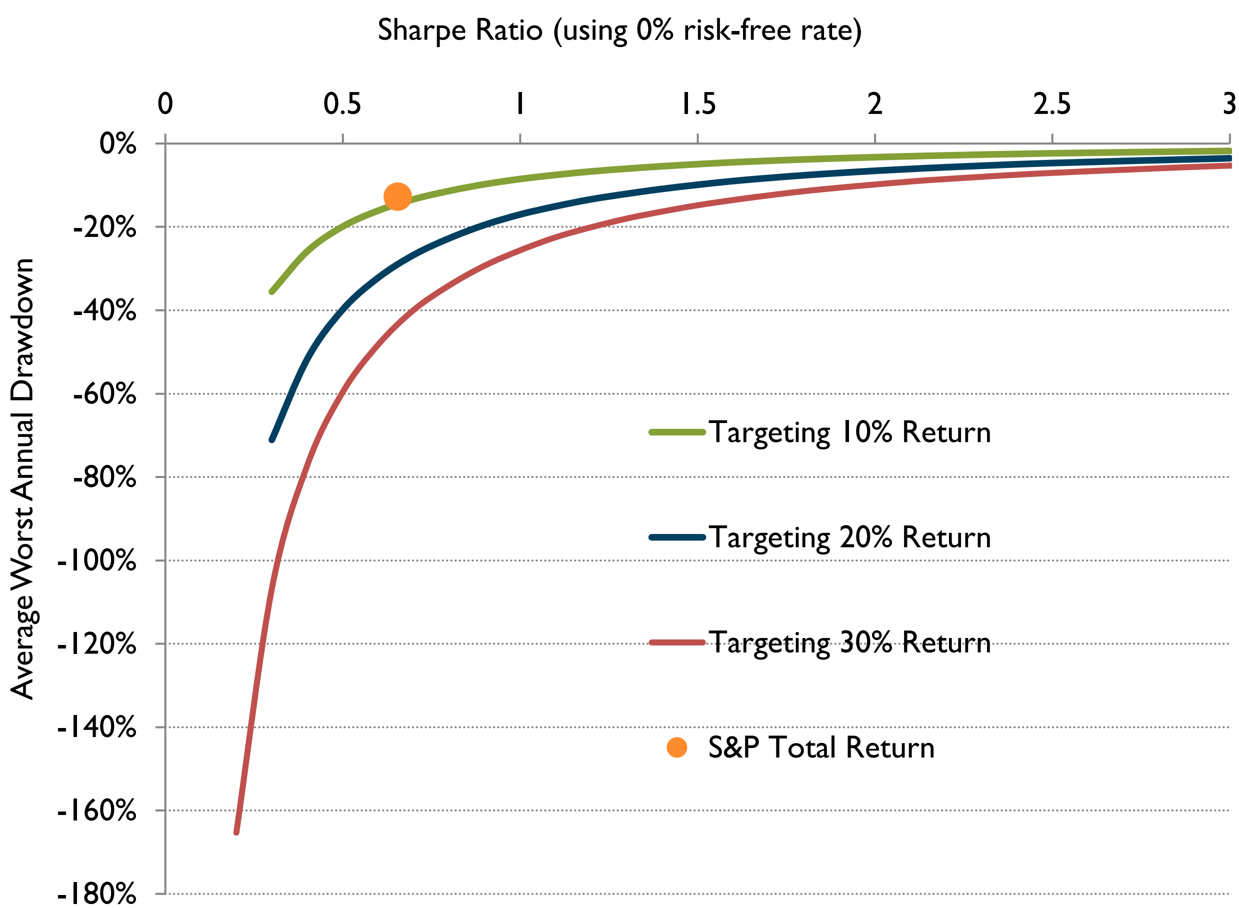

Figure 2: Data are calculated using 50,000 simulations of 252 trading days (i.e. year-long samples). Sharpe ratios are calculated assuming a 0% risk-free rate. Cumulative return data computed using simple returns (i.e. fixed booksize without compounding). Drawdowns are calculated at a daily (not monthly) frequency.

For reference, over the past 25 years, the S&P 500 had a Sharpe ratio of about 0.6 and an average annual return of 11.4%. Without even looking at the actual historical drawdowns, the simulation shows expected worst drawdown per year for the S&P 500 is about 17% and is plotted in the above chart.

Similarly, most fund strategies have Sharpe ratios of less than 1.0, which implies expected drawdowns that could be worse than the broader equity market even though they outperform the market over time.

These drawdowns, while painful, are completely "reasonable" if one uses the Sharpe ratio as an investing metric.

All business's ranging from private equity, passive index funds, hedge funds, active trading and more, generate expected returns and variability over time. Even if we knew nothing about the operating business but only had an estimate of the returns and risk one can and should calibrate expectations – including expected drawdowns which are higher than most realize - in advance.

It all comes back to setting expectations correctly. Having a fair estimate for returns, volatility and Sharpe ratio is important, but making sure they are within reason as they relate to each other is critical.

Sincerely,

Zem Sternberg
Senior Managing Partner

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