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A Simple Risk-Return-Ratio

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Most people seem to agree that there's some kind of trade-off between risk and return. Yet very few seem to have a clear picture of what this trade-off looks like. Clever modern-day professors might say that the more risks you take the greater returns, and this is sometimes parroted in the mainstream media. Yet most investors seems to do everything they can to avoid risk. After all, Warren Buffett is supposedly has said that the first rule of investing is not to loose money, while the second rule is not to forget the first rule.

The most common way to define risk is in terms of volatility. Standard Deviation is likely to be the most common risk measure and the Sharpe Ratio is likely to be the most common measure relating risk to return. Standard deviation is a measure of the average deviation from the mean return and the Sharpe ratio the return over the standard deviation for a time interval. I can certainly understand why people find these measures to be less intuitive. Why is that?

Well, a deviation from the mean can be both positive and negative. Sure, we are always confronted with the risk of a fall in the price of a share if invested. But what if we are invested and the price rises above the mean, is that really a risk? Not at all, that would be something great, wouldn't it? Moreover, if we see a fall in the price of a share we don't own, is that a risk? Not really, most people would call that an opportunity. Finally, we will always run the risk of seeing price rises in share we don't own.

We can summarize this in the following way:

Table 1 – Risk or Opportunity?

	Invested	Not invested
Rise	+	–
Fall	–	+

Hence, we can conclude that there are good reasons for finding volatility and standard deviation less intuitive. They include also good outcomes and opportunities we are looking for and certainly don't want to minimize. Consequently, this spills over also on the Sharpe Ratio, making it just as intuitively strange.

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Thus, we are left with two types of risk:

#1 Risk of losses

#2 Risk of missed return

While I have some great real-life stories of people that have missed out on some huge returns, most people would agree that risk of losses cause far more concerns than missing out on some return. A quick example to prove the point - let's say you turn on your computer at breakfast. First you check out a business website and read about a person having doubled the value of their investments over night. Then you check your own investments and find that they have halved over night. What would you remember by lunch time?

Hence, it seems proper to focus extra on risk #1, the risk of losses. This isn't a novelty I have come up with. I first encountered this kind of reasoning in Benjamin Graham & David Dodd's Security Analysis from 1934, and in Benjamin Graham's The Intelligent Investor from 1949. Benjamin Graham was the mentor of Warren Buffett, a professor, a successful investor and the father of value investing. Today, the fundamental idea of limiting the risk of losses is a starting point for hedge funds, value investors and traders around the world.

By no means does this suggest that people try to avoid losses at any cost. People only try to avoid losses greater than they can handle. Such a level might be to a large degree subjective but will somewhere be based on objective reality. Some can handle 50% losses, others only 10%. Some think they can handle 50% losses, but in reality can't sleep when facing 10% losses. Some think 50% losses are ok when they in fact would have to sell their house at that level of loss.

I also would like to add that from my own experience with clients, they certainly find it very intuitive if we define risk as risk of losses and use this as common ground for investing.

So, if we conclude that the most reasonable way to define risk is as the risk of losses, how can we measure it?

The most simple and general way of measuring such risk would be with the so-called *maximum drawdown*. Maximum drawdown (MDD) can be defined as:

MDD=the largest percentage drop from a peak to a bottom in a certain time interval [1]

See Wikipedia for more a formal definition. It's completely straight-forward to calculate MDD for any historical time interval, but of course a completely other thing to try to estimate future MDD.

When we have defined risk and know how to measure it, we can define a Risk-Return-Ratio (RRR) for any time interval like this:

RRR=RETURN (in %) / MDD (in %)

The most simple and general way of defining and measuring the risk-return-tradeoff that I can find. I have found similar ratios, like for example the Calmar ratio, the Sterling ratio and the

[1] Here's a code that can be used in Matlab or elsewhere for those interested, http://www.mathworks.com/matlabcentral/fileexchange/10367-maximum-drawdown.

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Burke ratio, but they are more ad-hoc measures based on drawdown. I have found one ration called the MER ratio that seems to be identical formally, but used in a different way. The use of the MER ratio seems to be confined to measuring only the risk and return of a fund since inception until the current date. I find RRR as I define it here to be more general, since it can be used for any time interval.

I'm always looking for simple and intuitive ideas and I believe this way of defining and measuring both risk and the risk-return-ratio is simple, general and intuitive. However, I'm not saying MDD is the only risk-return measure to use, or that RRR is the right risk-return-ratio to always use, only that I find it them the most simple to use, general and intuitive.

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