*a review of the Sortino Ratio*

# Risk investment

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**RISK** encompasses our daily lives; it follows us. Risk lies in wait with every activity we partake. We drive to work. Risk. We ride the elevator. Risk. We work with people. Risk. We walk onto the operations floor. Risk. We make operational decisions. Risk. We make financial decisions. Risk. We go to lunch. Risk. We make more decisions. Risk. We drive home and have dinner. Risk. We fall asleep. Finally, safe at last. Nope. Risk. And the process begins again tomorrow, assuming we wake.

To the pessimist, life is filled with risk. Still, to the optimist, life is filled with risk. So, it is our mindset that determines how we view risk. Will we consider risk negative, as is the accepted connotation associated with risk, or rather, will we consider risk positive and leverage it to our benefit? To some extent, our tolerance for risk determines our success. Such holds true to those born with nothing, and those handed the proverbial silver spoon.

Likewise, financial investments come with inherent risk, and arguably, the risk associated with financial investments is no different than risk inherent in other areas of lives. But it is the way we consider risk in financial investments that is important. We can choose to avoid risk at all costs, or we can embrace it. In financial investments, we should embrace it, but to embrace risk does not mean we do not respect it.

In financial economics, there are numerous methods for calculating risk. Risk can be considered through a simple cost-benefit analysis, or through a more complex cost-benefit analysis using statistics and econometrics. Regardless of the method, we are only comparing costs against benefits. In so doing, however, we are investing in risk. If we told you the probability your investment would succeed was 0.35, or 35%, you likely would not invest in the risk. However, if we told you the probability your investment would succeed was 0.85, you would be more prone to invest, all variables being equal. But what if we told you your investment had a 51% chance of succeeding? Would you invest in an investment with a coefficient of failure of 0.49? Theoretically, you should.

Though we will not ramble down the path of day trading far, this is one proven method to successfully day trade. Establish your trading parameters, e.g. buy-sell parameters, calculate the probabilities an equity will reach your parameters, and begin trading. When the price hits your established low, buy; when the price rises to your established high, sell. And repeat. Assuming you have established sound trading parameters, including calculating sound probabilities, you will profit far more often than not.

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Along with other measures of risk, the Sortino ratio is a variation of sorts of the Sharpe ratio. It the method we will discuss today.

The Sortino ratio is a risk-adjusted performance ratio that measures downside risk. The Sortino ratio has a significant advantage over the Sharpe ratio in that the Sortino ratio capitalizes on downside volatility, ($V=SD_{ds}*t_{ds}^{1/2}$), inherent within price movement, as opposed to total volatility, ($V=SD_t*t_t^{1/2}$)—but by using standard deviation, as opposed to volatility, per se. As such, the Sortino ratio becomes:

*Eq. 1*

$$Sortino\ Ratio = \frac{Rp - Rf}{\sigma_d}$$

Where,

*Rp = Annualized return*
*Rf = Risk-free rate*
$\sigma_d$ *= Standard deviation*

As an example, assume equity ABC has an annualized return of 14.6% and a standard deviation of 3.6%, while equity XYZ has an annualized return of 15.2% and a standard deviation of 4.1%. Both assets have a risk-free rate of 2.1%.

*Equity ABC*

$$Sortino\ Ratio = \frac{14.6 - 2.1}{3.6} = 4.03$$

Equity XYZ

$$Sortino\ Ratio = \frac{15.2 - 2.1}{4.1} = 3.20$$

Which asset is the best investment from a risk perspective? Equity ABC; as with Sharpe ratios, the higher the ratio, the more efficient the asset has performed. As such, Equity ABC generated a higher return per unit of downside risk. In this case, for Equity XYZ to be a better investment, its standard deviation would have to decrease to 3.24%, with other variables remaining constant.

When considering risk within potential investments, we want volatility on the upside, assuming we are not short-selling. Contrary to the Sharpe ratio, which considers upside and downside volatility, the Sortino ratio considers only downside volatility, or negative risk. Subsequently, Sharpe ratio provides a more accurate approach to risk than the Sortino ratio when trading on the upside. So, for most investors, the Sortino ratio should be used over the Sharpe ratio.

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**Herbert M Barber, Jr, PhD, PhD** serves as the Managing Partner and Chief Investment Officer of Xicon Economics. Intersecting the fields of engineering, finance, econometrics, and statistics, Dr. Barber is an expert in financial economics as it relates to the management of random walk theory and navigation of constructs surrounding efficient market hypotheses, especially within assets operating under extreme uncertainty. For over 30 years, he has provided advisory, consulting, and management of large capital investments in the private and public sectors. Additionally, Dr. Barber has published numerous scientific papers in refereed journals. Complementing his experience, Dr. Barber holds 5 academic degrees, including two research doctorates.