Harnessing Standard Deviation, Kurtosis, and Skewness for Better Investment Outcomes

Consider investing as solving a sizable, ever-changing puzzle. Understanding how various components come together and develop is more important than just knowing numbers or graphs. In order to make sense of it all, an investment advisor needs the appropriate tools. Think of Kurtosis, Skewness, and Standard Deviation as your tools for solving puzzles. They support you in better decision-making regarding investments and assist you in managing risk.

Standard Deviation: Measuring Volatility

Standard Deviation measures the amount by which individual data points deviate from the mean (average) return of an investment. A lower Standard Deviation implies the returns are tightly clustered around the mean, indicating lower volatility and risk. Conversely, a high Standard Deviation indicates greater dispersion of returns, thus more risk.

As an example, imagine an ETF (Exchange Traded Fund) has a Standard Deviation of 3%. Standard Deviation is a measure of how spread out the returns of this fund are. If we have a large number of returns from this fund, what this 3% means is that the majority of these returns (about 68% if we apply a rule from statistics known as the Empirical Rule) will fall within a range of 3% above or below its average return.

So, if the average return of the ETF is, let's say, 7%, then most of the time, you can expect the return to be between 4% (7%-3%) and 10% (7%+3%). This gives you an idea of the typical range of outcomes you could expect from investing in this ETF, which can be quite helpful in assessing whether the risk level aligns with your clients' investment goals. Of course, it's important to remember that this is just a general rule and actual returns can sometimes fall outside of this range.

Kurtosis: Detecting Extreme Outcomes

Kurtosis measures the likelihood of extreme outcomes, or the "fat tails" of a distribution. High Kurtosis means the potential for extreme positive or negative returns is greater than a normal distribution would suggest. Suppose you have two investment options with similar returns and standard deviations, but one has high Kurtosis. This indicates a higher probability of experiencing extreme returns with that investment—risk that may not be evident when considering Standard Deviation alone.

Let's use a simple lottery game to illustrate the concept of Kurtosis.

Imagine two lottery games, Game A and Game B. Both games offer the same average winnings - say $10. In Game A, you have a high probability of winning around $10, but the chances of winning much more or much less are relatively low. In other words, the winnings in Game A are normally distributed with low Kurtosis.

Game B, on the other hand, is a little different. Like Game A, the average winnings in Game B are also $10. But the chances of winning around $10 are lower. Instead, you're more likely to either win only $1 or hit the jackpot and win $100. In other words, the winnings in Game B have a high Kurtosis, with fatter tails indicating more extreme outcomes.

So, if you were to choose between these two games based on the average winnings (or returns in investment terms) and the variability of winnings (akin to standard deviation), both games would look pretty similar. But once you consider Kurtosis, it's clear that they offer very different risk profiles. Game A offers more predictable outcomes, while Game B has a greater potential for extreme outcomes. This added insight from Kurtosis can be crucial when deciding which risks to take in your investments.

Skewness: Gauging the Balance of Returns

Skewness assesses the symmetry, or lack thereof, in a distribution of returns. A positive skew indicates that the tail on the right side is longer, implying a greater probability of higher returns, while a negative skew suggests the opposite. For instance, an investment with positive skewness might deliver frequent small gains, punctuated by a few large losses.

Let's stick with the lottery game example to illustrate Skewness.

Suppose we have another two games, Game C and Game D. Both these games also have an average winnings of $10. But this time, we're considering how those winnings are skewed.

In Game C, the distribution of winnings is positively skewed. This means you often win small amounts - perhaps $5 - but occasionally, you hit a big win - perhaps $50. It's these rare big wins that pull up the average. Here, the long tail is on the right side of the distribution, reflecting the possibility of higher returns.

Game D, on the other hand, has a negative skewness. In this game, you often win moderate amounts - say, $15. However, every once in a while, you lose a significant chunk, say $50. Even though the average is still $10, the losses in Game D are more severe, and these rare large losses drag down the average.

Again, if you were only considering the average winnings and the variability of winnings (akin to standard deviation), Game C and Game D might seem very similar. But once you consider Skewness, you see that they present different risks: Game C with its potential for large wins, and Game D with its potential for large losses. Understanding Skewness can be very valuable when you're deciding between different investments with different risk-return profiles.

Using the Three Together

Each of these statistical measures provides a unique lens to view and manage risk. Using them together offers a fuller picture of an investment's risk profile.

For example, suppose an investment has a high Standard Deviation, high Kurtosis, and negative Skewness. This investment would be volatile with a higher likelihood of extreme outcomes, and those outcomes would more likely be negative. In contrast, an investment with a low Standard Deviation, low Kurtosis, and positive Skewness would indicate a more stable return pattern with less likelihood of extreme outcomes, and when extreme outcomes occur, they would be positive.

Conclusion

Your role as an investment advisor is to maximize your clients' returns while keeping risk within acceptable limits. Standard deviation, kurtosis, and skewness help you manage the risk-return trade-off more effectively. Understanding and utilizing these tools allows you to make more informed investment decisions, improve portfolio performance, and increase client satisfaction.