Deviation Analysis

Investors routinely overestimate their ability to tolerate volatility. Only after we are in the middle of a bear market do they realize they have as much tolerance for volatility as they have for electric shock. Only when it is too late do they realize one uncompromising axiom of investing: not losing money is making money. [1] If you can avoid a loss, you have effectively earned a return.

In this report we explain how, if you want to achieve a superior return in the stock market, having a reliable measure of deviation, dispersion or risk is essential. Then we explain that the single best measure of dispersion is the standard deviation. The standard deviation is effective, reliable and practical.

Why it is Important – Minimizing Risk is Maximizing Return

Imagine a situation where you can earn a 15 percent return, but that return is extremely erratic. Now imagine a situation where you can earn that same 15 percent return, but that return is almost perfectly steady; furthermore, imagine you can borrow money at a 10 percent rate. In the second scenario, you can leverage up. As you leverage up, your second stream of payments will eventually become as volatile as the first stream. But by the time it does, your 15 percent return may be 20 or 25 percent.

We are not advocating that you buy on margin or take out debt. We want simply to point out that there is a real link between low volatility and high return. They are flipsides of the same coin. Low volatility ***is*** high return, or at least it can be converted into high return as easily as two five-dollar bills can be converted into a ten-dollar bill. When you compare "apples to apples," investments with lower risk are of greater value than investments with higher risk (assuming identical returns).

Therefore, finding a metric that allows you to minimize your risk is like finding a metric that allows you to maximize your return. And we contend the metric that is the single best measure of that risk is a number called ***standard deviation***.

What is the Standard Deviation?

Standard deviation is a statistic designed to measure the degree of dispersion of a set of values around the mean of those values. It was developed in the 19th century by the Victorian era statistician Francis Galton. Galton also gave us the very useful concepts of correlation and regression.

We list the formula for standard deviation below:

[1] Furthermore, not losing money is easier than making money. If you lose half your wealth, then you have to double your wealth just to get back to where you started. And it is much easier to not lose half your wealth.

$$Variance = s^2 = \frac{\sum_{i=1}^{n}(y_i - \overline{y})^2}{(n-1)}$$

$$Standard\ Deviation = s = \sqrt{s^2}$$

Embedded in this hideously complex looking formula is largely just a formula for an average. The standard deviation, in a sense, is just an average deviation.

But a deviation is a deviation from the average. And if you take an average deviation from an average, you will always get zero. Therefore, a number of modifications have to be made to this average (or standard) to avoid getting zero.

Imagine you had never seen the standard deviation before, and you wanted to develop your own number to measure how disperse a set of 10 observations were around the average of those 10 observations. The first thing you might do is calculate the average of those 10 observations and subtract that average from each of those 10 observations. These are the deviations.

Then you might take an average of those 10 deviations. However, if you did that, you will always wind up with zero. Therefore, to avoid this outcome, you might take a square of each of those deviations.

Now that you have these squared numbers, you can take an average by summing these numbers and dividing by the number of observations (in this case it would be 10; however, since we lost a degree of freedom by subtracting the average, to be absolutely right, we have to divide by 9).

One last step is needed. Since we squared the deviations, then (to get our measure of dispersion back into the same units we started) we have to reverse this step by taking a square root.

This series of steps is precisely the formula for standard deviation. The standard deviation is simply an average deviation (with some extra steps mixed in to avoid getting zero). The lower the standard deviation is, the less disperse a series of numbers are.

Standard Deviation – Does it Work?

There are a number of different measures of dispersion, volatility, or risk. The ultimate test of them is this: Do they actually work? Do those measures predict the volatility that is actually displayed in future periods? By this measure, standard deviation has no equal.

To prove this, we studied the 2,000 largest U.S. companies over the period from 1994 – 2003. We calculated the standard deviation of monthly change in stock price over the first five-year period (1994 – 1998) and compared it to the standard deviation of monthly change in stock price over the following five-year period (1999 – 2003).

We then calculated the correlation between these two periods. Correlation is a measure of association and it can vary from -1.0 to 1.0. Zero means no association and 1.0 means perfect association.[2]

The correlation for the standard deviation of stock price was a stunning 0.60! Individuals who do not work with financial statistics daily may not understand or appreciate how extraordinarily high this is. You could forecast with a high degree of accuracy how volatile each of the 2,000 most popular U.S. stocks were going to be over a five-year period by simply looking at each stock's historical standard deviation.

To demonstrate this result was not a fluke, we repeated this exercise every five years through 2018. And these are the results we obtained.

	Correlation
Period 1 (1994 – 1998)	*
Period 2 (1999 – 2003)	0.600
Period 3 (2004 – 2008)	0.543
Period 4 (2009 – 2013)	0.725
Period 5 (2014 - 2018)	0.590

The degree of association persistently hovered around 0.60.

We simply can find no other measure of volatility that even comes close to this performance in terms of accuracy and consistency.

Incidentally, stock price tends to be one of the most erratic data investors have to contend with. Numbers that represent underlying economic activity such as sales, earnings and equity, tend to be more stable and the standard deviation of their changes tend to be even more consistent and predictable.

Implications

The best companies take risks. They find new and innovative way of doing things; they are pioneers. They also specialize in only what they do best. Lastly, they retain more of their earnings to avoid the costly practice of issuing more shares. These practices all lead to volatility. Companies with the greatest growth potential tend to be the most volatile.

But the key word in the previous statement is "***tend***." You must understand that a volatile performance is (in itself) not a positive characteristic. It is a negative characteristic that tends to accompany positive

[2] It would probably have been more correct to have used the covariance instead of the correlation. Covariance is linear; correlation is not. However, we wanted to simply demonstrate the very basic notion that the standard deviation is a very stable and predictable number. For our purposes, we felt correlation was sufficient.

characteristics. Consequently, it is possible to find companies that have high growth potential ***and*** low volatility.

And you can find these steady growers by studying the standard deviations of sales, profits, cash flows, and a whole host of other very useful and straightforward financial statistics.

Over the long run, favoring low-volatility companies (all other things being equal) will give your performance a lift like the second stage of a booster rocket. It will help to protect you (particularly in a bear market) and ultimately lead to greater return over the long run. Not losing money is making money.

Summary

The bottom line is this: seek out companies that have high return ***and*** low risk. If companies are identical (or almost identical) in their ability to grow their sales, profits, and dividends, then covet those companies that have shown the ability to achieve this growth in a steady way.

And no number is as helpful at finding these steady growers than standard deviation. Standard deviation is a deceptively simple number that has demonstrated a true ability to accurately predict the future volatility of the most important financial statistics (and many more). Standard deviation will be an indispensable tool in your toolkit. And it will help you to zero in quickly on those exceptional companies that can achieve both strong growth and steady growth.