All Averages Are Not Created Equal -- AAII

Turn to any listing of mutual fund returns, or even stocks, and you will likely see a "summary" of those results, referred to as the "average" return. For example, a listing of mutual funds in a particular category may show the average return for the fund in that category. A different listing may show a particular fund's returns for each of the last five years, and an average annual return over that five-year period.

Many individuals assume those averages are all calculated in the same way. In fact, they are not.

The dictionary definition of an average is: A single value that summarizes or represents the general significance of a set of unequal values. But there are a number of different ways to present a "summary" of values, depending on what you are seeking to measure.

What are the different "averages," and how are they created?

Arithmetic Average

Most people are familiar with the arithmetic average. This is the simple method you learned in school, which adds up all of the numbers in the list, and then dividends by the number of listings.

For example, let's assume you are looking at five mutual funds in a particular category with the following returns: 15%, 10%, 8%, 9% and 5%.

The simple average adds up all of those returns, for a total of 47, then divides by 5, for an average return among these funds of 9.4%.

The arithmetic average is used to summarize a simple list of returns that are independent of each other. If you are summarizing the returns of all of the mutual funds in a particular category, a simple average provides a return that is typical for that category.

Geometric Average

The picture becomes more complex when the returns you are attempting to summarize do impact each other. Returns that you earn in one year are carried over in the next year through compounding.

For example, let's assume you started with $1,000 in a particular fund, and over five years earned the following returns: 10% in year 1; 15% in year 2; 12% in year 3; 0.02% in year 4 and –30% in year 5. You would end up with $993.74.

What is your average annual return?

If you used the arithmetic average described above, you would add up all of the returns, for a total of 7.2, then divide by 5, for an average return of 1.4%.

But your ending amount—$993.74—is a loss compared to your original investment. Does that feel to you like a 1.4% average annual rate of return?

Arithmetic averages do not take into account the effects of compounding, and as a result, they overstate the real returns to an investor.

An investor's actual average return is a compounded average, also referred to as the geometric average.

To calculate the geometric average (you will need a financial calculator), you take the return in decimal form (10% is 0.10) and add 1 to it; then multiply all the numbers together; then take the nth root of the result [where n is the number of years; the nth root is the number that, if you multiply it by itself for n times, you achieve the result—for instance, 3 is the nth root of 9 over 2 periods]; subtract 1 from the result and then multiply by 100 and you have the average annual return for the period covered. In this instance, it is an average annual loss of 0.13%. [See the box on the following page for the calculations.]

Weighted Average

A weighted average provides a useful summary of returns if you want to emphasize certain

returns above other returns.

Why would you want to do this?

Let's assume you have invested in the five mutual funds with the same performance that we used in the first example. However, let's also assume you have 60% of your assets invested in the fund that received the 15% returns, and you have 10% of your assets in each of four funds that earn the remaining returns.

Since you have most of your funds in the highest-earning fund, the impact of that fund's return on your own portfolio is higher.

To summarize the real impact on your portfolio of these five funds, you could calculate a weighted return by simply multiplying each return by the weighting (in this case, the percentage of assets in each fund), and then adding up the results. [You could, of course, also determine an actual return for your portfolio.]

Calculating Averages

Returns
10.0%
15.0%
12.0%
0.2%
–30.0%

Arithmetic Average

$[10\% + 15\% + 12\% + 0.2\% + (-30\%)] \div 5 = 7.2\% \div 5 = 1.4\%$

Geometric Average

$[1.10 \times 1.15 \times 1.12 \times 1.002 \times (1 - 0.3)]^{1/5} - 1 = 0.9987 - 1 = -0.0013 = -0.13\%$

Weighted Average

Assuming returns of 15% (weighted 60%), and 10%, 8%, 9% and 5% (each weighted 10%):

$[15\% \times (0.60)] + [10\% \times (0.10)] + [8\% \times (0.10)] + [9\% \times (0.10)] + [5\% \times (0.10)] = [9 + 1 + 0.8 + 0.9 + 0.5] = 12.2\%$

Using the Averages

You don't necessarily need to calculate all of these averages on your own, but the ambiguity of the term can lead to confusion. It helps to have an understanding of the differences in what they represent and how they are calculated.

And if you are embarrassed to admit that you doubled your money (100% each year) two years in a row and then lost everything (–100%), just say you earned a 50% "average" return.