Performance Calculations

Understanding Time-Weighted vs. Dollar-Weighted Rates of Return

Investment performance seems like it should be easy to measure and even easier to understand, but investors often find that interpreting performance measurements can be confusing. One reason for the confusion is that the financial industry standards for performance reporting are designed to accurately measure the "performance" of an investment manager and not necessarily the personal performance of an individual. In this article we'll clarify these differences to help you better understand your own performance report and why your Asset Class Investing portfolio uses a particular method.

The two most common ways to report performance are dollar-weighted rate of return (DWRR), and time-weighted rate of return (TWRR). While dollar-weighted performance is weighted by the amount of dollars in an account at the beginning and end of the performance period, time-weighted performance is based on the amount of time the dollars were invested.

A dollar-weighted rate of return is highly influenced by the timing of cash flows into and out of your account. Therefore, the return is higher when more money is invested during periods of greater price appreciation. This method is more "investor-centric" because it does not isolate the funds' performance from an investor's luck or timing.

Time-weighted rate of return measures how much your investments returned on average, without the influence of the size or timing of contributions. You can think of TWRR as the return on your portfolio, assuming $1 invested at the beginning and ignoring cash flows in and out. This method is used to compare investment choices or strategies vs. appropriate benchmarks. Since investment managers usually have no control over client cash flow decisions, TWRR is the only fair way to evaluate managers versus their benchmarks.

Let's run through the return calculation for a sample, hypothetical investor. Please note, this example is not indicative of any actual investment product or strategy.

Four years ago, this investor put $200,000 in a portfolio aligned with her long-term goals. This portfolio then grew by 10% a year for 4 years. At the start of the 5th year the investor received a large inheritance, worth $1,000,000, and added it to the account. During this same year the market happened to decline, and the portfolio lost 10%. The portfolio value historically would look like this:

Date	Event	Portfolio Value	Cumulative Gain/Loss
January 1, Year 1	$200,000 contribution	$200,000	$0
Dec 31, Year 1	10% market gain	$220,000	$20,000
Dec 31, Year 2	10% market gain	$242,000	$42,000
Dec 31, Year 3	10% market gain	$266,200	$66,200
Dec 31, Year 4	10% market gain	$292,820	$92,820
Jan 1, Year 5	$1,000,000 contribution	$1,292,820	$92,820
Dec 31, Year 5	10% market loss	$1,163,538	($36,462)

Because her account was so much larger during the market decline of the 5th year, the investor has actually lost money ($1,163,538 - $1,200,000 = -$36,462) when compared to her total contributions. However, the statement shows a positive time-weighted annualized rate of return. How can this be correct?

The answer lies in the time-weighted rate of return calculation, where each annual period counts equally. With this performance measure, the portfolio's positive performance during the first 4 years would account for the 4/5s of the return, with the last year being the last 1/5. The performance will show a positive 5.67% annualized return[1]; reflecting the overall portfolio performance during the entire 5 year period because each year's return has an equal weight in the total return calculation. Also, the timing of the cash inflow to the portfolio, of which the portfolio's money managers had no control, does not influence the return.

Portfolio Performance Report

	Jan 1, Year 1 to Dec 31 Year 5
Beginning Portfolio Value	$200,000
Additions	$1,000,000
Withdrawals	$0
Ending Portfolio Value	$1,163,538
Total Gains (after fees)	($36,462)
Annualized Total Return	5.67%

For Illustrative Purposes Only. Not indicative of any actual investment product or strategy.

If you were to use dollar-weighted calculations, the 5th year's performance would overwhelm the return number, because the value was so much higher during that one year. In this scenario the portfolio's previous 4 years of positive performance would have less weight, and the focus would almost entirely be on the 5th year, during which the market happened to decline. In this scenario the DWRR would be (1.86%)[2], since the portfolio's money managers' performance is dominated by the timing of the cash flow received.

It's important to note that this scenario could easily happen in reverse. If investments were to decline for the first few years and then rise after large contributions, money managers using DWRR would be showing a positive return even though they didn't necessarily have a good long-term record. Another example would be a withdraw-phase retirement account where the balance was steadily decreasing over time.

Time-Weighted		Dollar Weighted	
Pros	**Cons**	**Pros**	**Cons**
Comparable across advisors, indexes and benchmarks	May appear to conflict with current dollar amounts	Directly related to current dollars in account	Highly influenced by timing of cash flows
Provides historical record	Ignores cash flows	Personalized return calculation	Calculation is not precise
Easy to understand formula			Not comparable to market indexes

Performance reports are meant to act as a yardstick to help you evaluate how your portfolio has navigated financial markets. Because it is the financial services standard, using time-weighted returns means that when you analyze the performance of different managers, you are seeing a true apples-to-apples comparison, allowing you to make better informed decisions.

[1] TWRR = (1+10%) x (1+10%) x (1+10%) x (1+10%) x (1+(-10%)) -1 = 32% cumulative return. Total returns greater than 1 year are then annualized. The annualized return is calculated as (1 + total return)^(1/(Time/365)) = (1+ 32%) ^ ((1/1825/365)) -1 = 5.67%.

[2] DWRR = Initial cash flow + (CashFlow1) / (1 + Return)^1 + (CashFlow2) / (1+Return)^2 + (CashFlowN) / (1+Return)^N In this scenario the DWRR would = $-200,000 + ($-1,000,000) / (1+R)^4 + ($1,163,538) / (1+R)^5, solving for return = (1.86%).