

# ALBION FINANCIAL GROUP

GUIDING CLIENTS TO A LIFETIME OF GOOD DECISIONS



## DOLLAR WEIGHTED VERSUS TIME WEIGHTED RETURN CALCULATIONS SHOULD YOU CARE?

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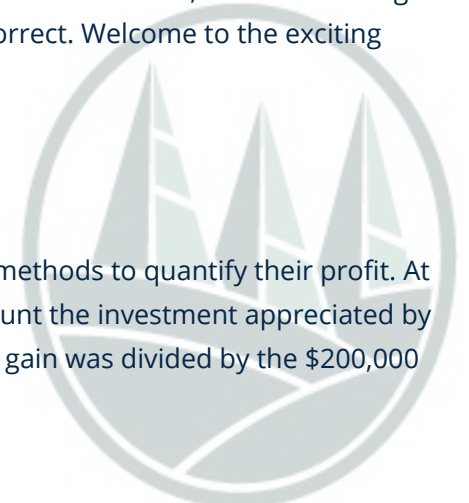
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Imagine; you invest \$100,000 in a stock. Six months later you put another \$100,000 into the same stock. Six months after that you sell all your shares for \$300,000. After a few rounds of self-congratulation on your stock picking prowess you decide to calculate your return. You know you invested \$200,000 and had gains of \$100,000. Since your gain of \$100,000 is 50% of the \$200,000 invested your gain is 50%. While this is a straightforward calculation something doesn't feel quite right. Should the fact that only half the money was invested initially with the other half invested midway through the time period cause you to adjust your calculation? In search of answers you go online and find two rate of return calculators. You enter your data and click to the answer. One says you earned 66%, even better than your own calculation had indicated. But the other says your rate of return was...Zero. Yes, zero. Something must be wrong. You recheck your data and determine that both answers are correct. Welcome to the exciting world of dollar-weighted versus time-weighted returns!

## WHAT ARE THE DIFFERENCES BETWEEN THE TWO METHODS?

Ever since assets have appreciated people have worked hard to come up with methods to quantify their profit. At its simplest, the appreciation calculation is straightforward. Just divide the amount the investment appreciated by the initial value of the investment as in the example above where the \$100,000 gain was divided by the \$200,000 investment showing a rate of return of 50%.

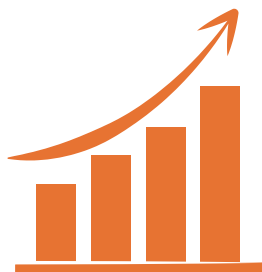


However it starts getting a bit more complicated if during the period the performance is being measured money is added to or taken from the investment account. Dollar-weighted and time weighted return calculations are the two methods that account for cash inflows and outflows during the performance measurement period.

## DOLLAR-WEIGHTED RETURNS

Let's look at dollar-weighted returns first. While the calculation is straightforward the details are challenging. All you have to do is divide the gain by the average capital base. Gain is the amount left over after subtracting all the money put into the investment. Average capital base is a bit trickier; it is the sum of the initial investment plus or minus any funds added to or removed from the investment after the start date, adjusted for the time period the funds were in the account. That's a tough sentence; here is an example:

Suppose we start our investment account with \$100. Six months later we add another \$100. Six months after that we want to measure the performance for the previous 12 months. What is the average capital base? It is the initial \$100 plus half of the second \$100 added to the account, for a total of \$150. Only half of the second \$100 is included because it was only invested for half the period. If instead of adding funds, \$50 had been removed from the account halfway through the performance period, the average capital base would have been \$75; the initial \$100 minus half of the \$50 that was removed.



The advantage to the dollar weighted calculation compared to the basic calculation where gain is divided by the amount invested with no adjustment for cash inflows and outflows is that the dollar weighted calculation modifies the performance to reflect the gain relative to the funds actually available for investment.

## TIME-WEIGHTED RETURNS

Time weighted return takes dollar weighted returns one step further. In calculating time weighted returns, first you divide the performance period into smaller time periods; quarters, months, weeks and days are typical. Then for each of these smaller time periods a dollar weighted return is calculated. Finally, these smaller period returns are compounded to generate the time weighted return for the whole performance period.

Using time weighted returns further diminishes the impact of cash inflows and outflows on the actual return of the assets in the portfolio. A bit of math clarification is in order. When compounding multiple periods of return you must add 1 to each percentage number and then subtract 1 from your final result. Here is why. Suppose you are compounding quarterly and for three quarters in a row you earn 5% per quarter. Mathematically 5% is 0.05 so if we multiply  $0.05 * 0.05 * 0.05$  we get .0001, or one tenth of one percent. Whenever you multiply any number by a number less than 1 the product will be less than the initial number. So here is what to do; add 1 to each percentage to be multiplied then subtract 1 from your answer:

$$1.05 * 1.05 * 1.05 = 1.16$$

$$1.16 - 1 = .16 = 16\%$$

5% per quarter compounds to a 16% total return after three quarters.

## WHICH METHOD SHOULD YOU USE?

So which return calculation makes the most sense? It depends. The basic “gain divided by amount invested” calculation which does not take into account cash inflows and outflows provides the most clarity when you are trying to figure out how many more (or less) dollars you have than you did before investing. But it does not capture the impact of cash moving in and out of the investment account.

Dollar weighted returns capture more than just the return of the assets in the portfolio. They also give you a better idea of the returns earned on the money you had at risk. If your advisor helps you determine when to add funds to the account, or when it makes sense to pull money out, the dollar weighted return is more likely to highlight the impact of that advice. More typically, cash flows into or out of an account are driven by the client and are based on cash flow needs, savings strategy and other life events.

If you want to hone in exclusively on the impact of the investment decisions made within the portfolio then time weighted returns are likely the better measure. However most investors will find that investment portfolios experiencing large inflows and outflows will have time weighted performance that differs from managed portfolios that do not have such contributions and withdraws.

Of course if there are no cash inflows and outflows after the initial investment then all three performance calculation methods; gain divided by amount invested, dollar weighted, and time weighted, will show the same investment return. (great point .... Correct but not intuitively obvious).

Back to that opening problem; why did one performance method show a 66% return while the other showed a 0% return? Here are more details on the twelve months of investing. During the 12 month period the \$100,000 investment lost half its value, to \$50,000, in the first six months at which point an additional \$100,000 was added. In the second six months the investment doubled in value so the \$150,000 grew to \$300,000.

First we'll calculate the dollar weighted return which is the gain divided by the average capital base. The gain is \$300,000 less the \$200,000 that was invested, or \$100,000. Next comes the average capital base. We had \$100,000 for the full period and \$100,000 for half the period for an average capital base of \$150,000. \$100,000 gain divided by the \$150,000 average capital base is .666, or a 66.6% return. Not bad.



Next we'll calculate the time weighted return and we'll do it by calculating the dollar weighted return for two time periods and then compounding them. For the first six months the stock declined by \$50,000 and the average capital base was \$100,000 for a return of -50%. For the second six months the stock appreciated by \$150,000 on an average capital base of \$150,000 for a return of 100%. To compound these two periods we add 1 to each return and multiply them together:

- First, add 1 to each period return;  $1 - 50\% = .5$   
 $1 + 100\% = 2$
- Then multiply the adjusted return numbers together;  $2 * 0.5 = 1$
- Finally, subtract the 1 from your result;  $1 - 1 = 0$  which equals 0.0%



## THE BOTTOM LINE

Performance measurement should be a detailed and accurate exercise following prescribed performance calculation standards. Yet even when the calculations adhere to a standard the results can vary significantly depending on which performance calculation method is used. Next time you're quoted an investment return you'll know to ask a few follow-up questions to ascertain what the investment in question might have actually done for you.

## KEY TAKEAWAYS

- The dollar-weighted rate of return calculates the performance of an investment that accounts for the size and timing of deposits or withdrawals.
- The dollar-weighted rate of return is calculated by finding the rate of return that will set the present values of all cash flows equal to the value of the initial investment.
- The time-weighted return multiplies the returns for each sub-period or holding-period, which links them together showing how the returns are compounded over time.
- The time-weighted return helps eliminate the distorting effects on growth rates created by inflows and outflows of money.

### — FOR MORE INFORMATION —

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