TIME WEIGHTED RETURN

CLS INVESTMENTS

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INTRODUCTION

An investor evaluating their investment portfolio often simply wants to know whether they had a gain or a loss during a certain period. Defining that gain or loss brought about the creation of performance measures. Performance measures are designed to produce numbers that represent percentage returns. They are designed to give investors relevant information on their investments' and total portfolio's performances. The information should give them a common means of measure against other investments and other portfolio managers.

Although an investor's evaluation requirement may be simple in nature, measuring performance and the resulting return figures can become very complex. There are several ways to measure performance, and under given circumstances different performance measures will even produce different returns from the same data.

This primer is designed to provide information on the construction and relevance of some of the different performance measures. The primer will focus on questions about how returns are calculated and why CLS Investments ("CLS") uses the Time-Weighted Return ("TWR") measure. The main goal is that this piece will provide enough insight to you so that you may be better equipped to address questions regarding account performance in the future.

To achieve its objectives, the primer will show how three measures of performance are defined and will diagram their calculation. It will then explain the scenarios in which the different measures are used. Here we will also begin to focus in on TWR. Before finally summing up why CLS and other money managers employ TWR, there are several examples illustrating TWR numbers. Hopefully the examples will provide insight for solving future performance questions.

DOING THE MATH

Before going any further, it would be appropriate to define some performance measures:

Holding Period Return ("HPR") = The simple percent change in a portfolio's total market value over a given period. It is a single-period version of Dollar-Weighted Return.

Dollar-Weighted Return ("DWR") = Rate of return method that measures changes in total dollar value, treating any additions or withdrawals of capital as a part of the return along with income and capital gains/losses.

Time-Weighted Return ("TWR") = Rate of return that eliminates the effect of additions and withdrawals that can distort Dollar-Weighted Returns by measuring the performance as a percent of capital at work during each interval between flows and then linking them together to produce a return for a stated period.

Let's look at some simple equation models in hopes of gaining a more complete understanding of these measures.

Holding Period Return

HPR is the simplest of measures. It is a single-period form of the DWR. It is also the one that investors first think of when they are reviewing their portfolio. HPR is the portfolio's beginning value subtracted from its ending value. The difference is then divided by the beginning portfolio value. This is shown below as:

HPR = MVE – MVB / MVB

Where:
MVE = Market Value at the End of the Period.
MVB = Market Value at the Beginning of the Period.

This is an intuitively appealing way for many investors to view their portfolio's performance, because it addresses these straightforward issues:

"How much was my portfolio worth?"
"How much is it worth now?"
"The difference must be the return."

This is a valid way to view a portfolio's performance. However, it is also a very simplified way. Multiple time periods, cash contributions and withdrawals, plus the additions of securities to the portfolio can all distort the simple HPR.

To address these things that affect real-world portfolios, more complex measures should be employed. One such measure is a multi-period DWR. Another even more sophisticated measure is TWR.

Dollar-Weighted Return

A multi-period DWR is also referred to as the Internal Rate of Return ("IRR"), because it will generate a discount rate where the present value of the cost of an investment equals the present value of the return on the investment. For example, suppose we start a portfolio with the purchase of a share of a mutual fund. At the end of the one period, we add another share. What is the DWR of this portfolio at the end of the second period? To find the answer we would use the following equation:

S1 + [S2 / (1 + r)] = [EMV/ (1 + r)2]

Where:
S1 = the cost of the first initial share
S2 = the cost of the second share purchased at the end of year one
EMV = the Ending Market Value for the portfolio consisting of the two shares
r = the IRR or the Dollar-Weighted Return of the portfolio

Solving for 'r' is a complex and time-consuming task. It involves a "trial and error" technique of narrowing down the possible numbers and eventually finding the value that will make the equation work. Computers and calculators are nearly essential in order to calculate DWR. The above example would become even more complex with the addition of dividends and security sales to a portfolio.

The DWR calculation gets its name from the way its return number will be more influenced by periods when the portfolio's dollar-value is larger. The above example is "dollar-weighted" because the performance in the second year, when two shares are owned, has a greater influence on the overall return than the first-year when only one share was held. This is the inherent flaw in DWR.

Because it is so influenced by cash flows, a DWR can be positive only because money was added; or it could be negative due only to withdrawals from the account. So it is easy to see how simply contributing or withdrawing funds from an account sways a DWR. To bypass the flaws of DWR, we need a performance measure that eliminates the distortions caused by cash flows. Time-Weighted Return is just such a measure.

Time-Weighted Return

An alternative to DWR is the TWR calculation. TWR is designed to eliminate the effect of cash flows that can skew DWR. In doing this, it allows an investor to directly measure their portfolio's true performance and compare the performances of different money managers over a given time frame.

To calculate a TWR and eliminate the cash flow affects, it is important to first identify what is meant by a cash flow. It means any time an investor adds to, or takes away from their portfolio by contributing or withdrawing cash and/ or securities. The construction of the equation then revolves around the cash flow points. Each time there is a contribution or withdrawal, an interval return is calculated. Then a final interval return is calculated from the last cash flow to the end of the period. These interval returns are then converted into multipliers by adding one to each. They are then multiplied together. Finally you take this product and subtract one and you have your TWR.

Let's look at an example where there is a contribution to the portfolio. The TWR calculation begins by finding the interval returns before and after the contribution.

(MVBC - BMV) / BMV = r1
(EMV - MVIC) / MVIC = r2

Where:
BMV = Beginning Market Value
EMV = Ending Market Value
MVBC = Market Value Before the Contribution
MVIC = Market Value Including the Contribution

Where r1 is interval return up to the contribution and r2 is the interval return from the contribution until the end of the period. Now create multipliers out of r1 and r2. Multiply together and subtract one. The result is the TWR.

[(1 + r1)*(1 + r2)] - 1 = TWR

Obviously, this is a very simple example. The more contributions and withdrawals that occur and the longer the time frame the more complex the TWR calculation can become.

WHICH PERFORMANCE MEASURE TO USE

The answer to this question often comes down to what you are trying to measure and who is doing the measuring.

As mentioned earlier, investors will often use the simple, single-period HPR measure because of its ease of use, simple calculation, and its intuitive appeal. To take it a step further, the multi-period DWR seems even more appealing. After all, the more money you invest in a security when its performance is superior; the more money you will end up with. Shouldn't your performance measure reflect this fact? Well, the DWR does just that. You can use HPR or DWR when you need to evaluate the overall size of a portfolio and its growth in dollars. However, they are inappropriate when it comes to measuring performance in a managed account for reasons discussed below.

TWR and Managed Accounts

First, a money manager may not directly control the timing or the amount of client contributions and withdrawals from their portfolio. Since the manager cannot control cash flows and the total dollars invested in the portfolio, it would be inappropriate to use a measure like DWR that skews returns based on dollar amount size. Remember that TWR gives a rate of return that eliminates the effects of cash flows.

Second, TWR is used by the money management industry because it measures how the money was managed. It shows the investor how well their money was managed, whether the portfolio was worth $1,000 or $1,000,000. The TWR number can then be used in direct comparison with other managers' TWRs for the same period. This allows investors to evaluate managed portfolios among various investment managers.

TWR will generally differ from DWR, and the difference can be positive or negative depending on the period returns and portfolio activity. These differences can sometimes confuse an investor unfamiliar with TWR. This usually happens at an early stage of a portfolio's management, when assets may flow into an account at various times, or anytime there are numerous cash flows in and out of an account.

PORTFOLIO EXAMPLES

This section will show some examples that demonstrate how TWR can occasionally give counter-intuitive results. The goal here is to help provide insight into addressing performance questions that clients may present.

Example One: Portfolio's TWR is Much Lower Than Expected

Features of the Portfolio:

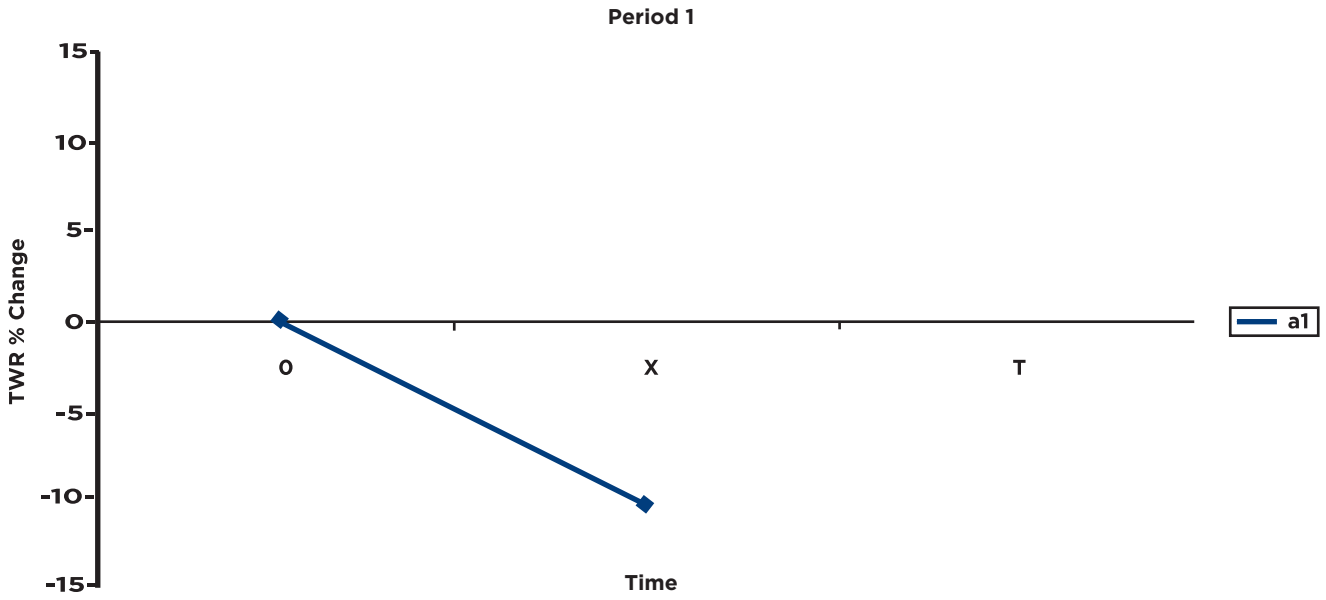
- Two Assets in the Portfolio (p) at the end of the Period
- Asset 1 (a1) has TWR of 10%
- Asset 2 (a2) has TWR of 5%
- The TWR for the Portfolio (p) is -2.8%

How can the TWR for the total be –2.8% when each individual asset had positive returns of 10% and 5% respectively?

This is the question a client would likely ask about the TWR for Portfolio A. To answer this, let us break down the return graphically.

Graph 1:

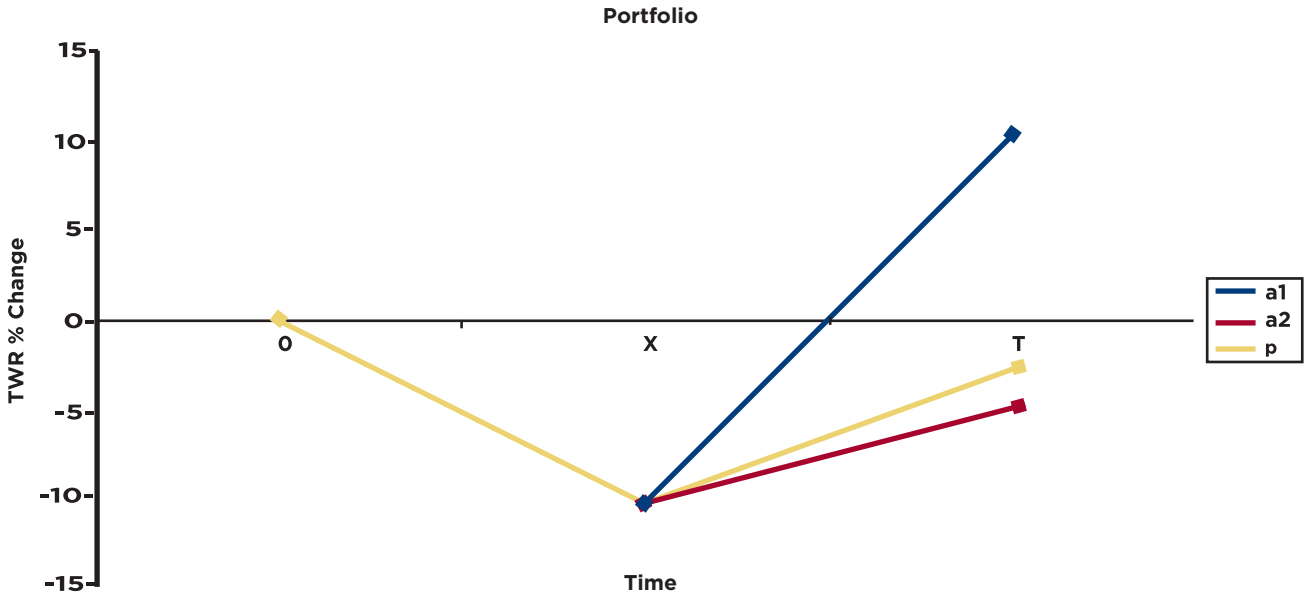
- From time 0 to time X, Portfolio (p) consisted of only Asset 1 (a1)
- Asset 1 returned –10% from time 0 to time X



At time X a contribution is made to the Portfolio (p) by adding Asset 2 (a2). Asset 2 is much larger than Asset 1 and makes up 80% of the Portfolio. Therefore Asset 1 now makes up only 20% of the total portfolio.

Graph 2:

- From time X to time T, (a1) goes up 20%
- From time X to time T, (a2) goes up 5%
- From time X to time T, (p) goes up 8%
- For the total period, 0 to T, (p)'s TWR is –2.8%



To construct the TWR for the entire time frame from 0 to T, we link the return from time 0 to X with the return from time X to T. The return from time X to T is the weighted return of the individual assets.

TWR for (p) from X to T = 8% = (20%)*(20%) + (80%)*(5%)

Now link the two intervals TWR. Remember (a1) was the (p) from 0 to X, so (a1)'s return for that period is also (p)'s.

TWR for (p) from 0 to T = -0.028 or –2.8% = {(1-0.10)*(1+0.08)} – 1

The resulting TWR is for the portfolio and is not simply the individual assets in isolation added together. The graph shows how the portfolio's first time-period negative return dominates the second period's positive return.

Example Two: Portfolio's TWR is Much Higher than Expected

Not all cash flow events cause TWR to give numbers that may disappoint investors. Sometimes the TWR will give a number that may be a pleasant surprise. Take a look at this example.

Features of the Portfolio:

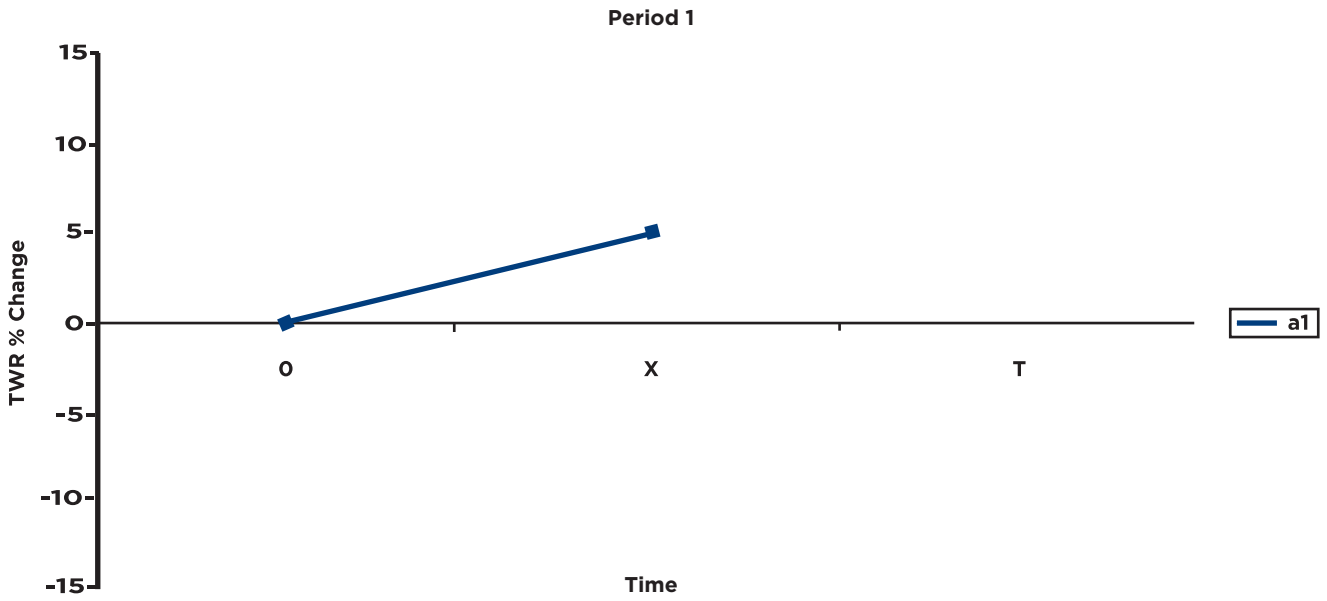
- Two Assets in the Portfolio (p) at the end of the Period
- Asset 1 (a1) has TWR of 6%
- Asset 2 (a2) has TWR of 11%
- The TWR for the Portfolio (p) is 14.5%

The obvious question on this one would be: how could the portfolio do so much better than the assets that it contains?

Once again let us go to the graphs.

Graph 1:

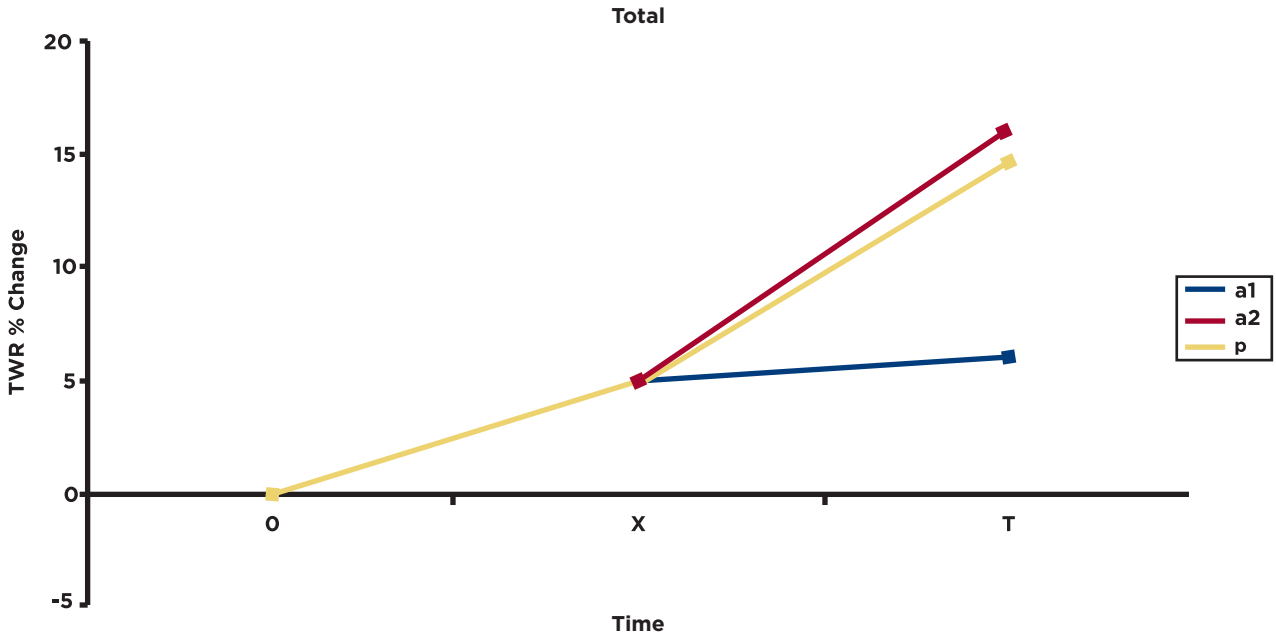
- From time 0 to time X, Portfolio (p) consisted of only Asset 1 (a1)
- (a1) returned 5% from time 0 to time X



And once again, at time X a contribution is made to the Portfolio (p) by adding Asset 2 (a2). Asset 2 (a2) is much larger than Asset 1 and makes up 80% of the Portfolio (p). Therefore Asset 1 (a1) now makes up only 20% of the total portfolio.

Graph 2:

- From time X to time T, (a1) goes up 1%.
- From time X to time T, (a2) goes up 11%.
- From time X to time T, (p) goes up 9%
- For the total period, 0 to T, (p)'s TWR is 14.5%



Here the TWR for the (p)'s second period (from time X to T) is:

TWR for (p) from X to T = 9% = (20%) (1%) + (80%) (11%)

The resulting TWR for the entire time (from time 0 to T) again will come from the linking of the interval period TWR's.

TWR for (p) from 0 to T = 0.145 or 14.5% = {(1+0.05) (1+0.09)} – 1

These examples also demonstrate how a portfolio's TWR is more complex than a simple "sum of its parts" approach. The returns of individual assets in isolation may not necessarily be totally reflective of the entire portfolio's TWR. It greatly depends on when assets flowed in or out of the account, in addition to the underlying market conditions.

TWR and a Client's Return Perceptions

Sometimes a client will get a perception in their mind of what their portfolio return should be, and when their perception differs from the actual TWR they can get confused.

The graphs and descriptions above can be helpful; however, they may still be too complex to convey the concept of TWR to someone unfamiliar with it. So to conclude this section, let's look at two simple examples where a client's perception may differ from the actual TWR.

Assume:

- Client has a CLS managed account
- On the First Day of the period, the account is worth $50,000
- By the Last Day of the period, the account has risen by $3,000
- The Client makes a single withdrawal from the account during the period for $20,000

The Client may view their performance as earning $3,000 on a $50,000 investment. Thus, they may expect a 6% return. ($3,000 / $50,000 = .06 or 6%)

However, the withdrawal and the performance up to it and the performance after it must be considered. Now, what if the account was entirely flat, no-growth, zero return, from the first day of the period up to the withdrawal. Then from the withdrawal point to the end of the period it returned 10%. The resulting TWR for the period would be as follows:

TWR = {(1+0.00)*(1+0.10)} – 1 = 0.10 or 10%

The $3,000 gain was not made on the original $50,000 but only on the $30,000 left after the withdrawal. The TWR reflects this fact.

Let's change our assumptions slightly for another example:

- Client has a CLS managed account.
- On the First Day of the period, the account is worth $30,000
- By the Last Day of the period, the account has risen by $5,000.
- The Client makes a single contribution to the account during the period for $20,000

The Client may view this situation as a return of 16.7%. A $5,000 gain on the $30,000 investment ($5,000 / $30,000).

Once again their perception would not be correct. Again, assume zero return on the account from the first day of the period up to the contribution point, and from that point until the end of the period a return of 10%. Consequently, we again get a TWR for the period of 10%.

TWR = {(1+0.00)*(1+0.10)} – 1 = 0.10 or 10%

Here, the 10% TWR is represented in the $5,000 the account gained after the additional money was contributed.

Although, these two examples ended with different dollar gains their TWR's were both 10%. The TWR method kept the cash flows from skewing the portfolio return numbers.

CLOSING

Interpreting portfolio performance can sometimes be a difficult and stressful endeavor for an investor. It is the cause of a great deal of tension between clients, registered representatives, and money managers. Hopefully this primer has been helpful in providing a better understanding of performance, and has enhanced your ability to interpret the performance numbers you may be confronted with in the course of your job.

So in final summation, the two key elements to take away from this in regards to TWR are: that cash flows, which affect the dollar amount of an account, do not affect the TWR; and that, the TWR measures how the money was managed not the overall dollar amount change.

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