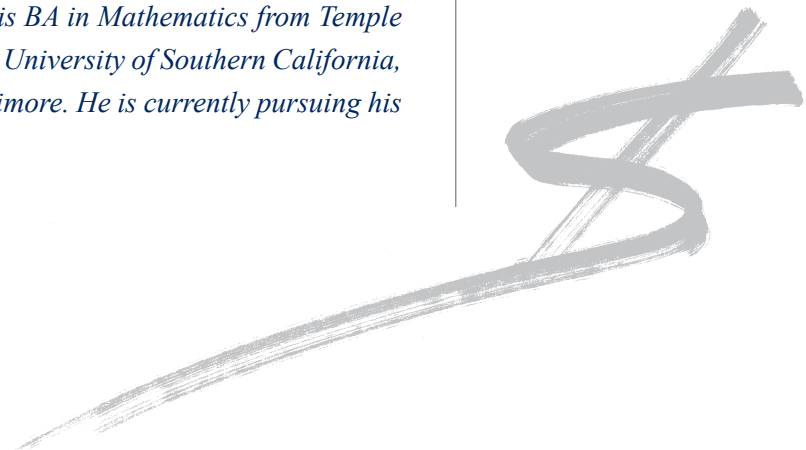THE SPAULDING GROUP

When Performance Numbers Don't Make Sense

This white paper provides examples of the differences between time-weighted and money-weighted return, and provides a better understanding as to what we're actually measuring when using these formulas.

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Every once in a while, we have the opportunity to be reminded about what performance measurement actually measures. The first time this happened to me was in 1987 (actually, early 1988) following the *market adjustment* of October 19th. I was working for a New York City-based investment advisor and many of the returns didn't seem to make sense. Several of our clients had net losses in the value of their portfolios for the year, but were getting reports claiming positive returns.

Well, I was recently reminded of this possible situation once again by a client. One of her portfolio managers had a positive return for a particular segment of a mutual fund even though there was a net loss in dollar terms. She then went on to pose several excellent hypothetical examples that showed how returns could, at times, appear not to make sense.

There were two key points worth addressing:

- First, what's the explanation when time-weighted rates of return produce numbers that appear to make no sense?

- Second, what's the appropriate performance measurement for sub-portfolio returns.

QUESTIONABLE RETURNS – HOW CAN THIS BE?

First, Some Things to Recall About Time-Weighted Returns

Why does the money management industry require time- weighted rates of return? Because they negate the impact of cash flows. Steve Lerit addressed this issue quite well in an earlier article in *The Journal of Performance Measurement*.[1] But let's spend a few moments to review some background information.

The Bank Administration Institute (BAI) made time-weighted returns a standard requirement in 1966 with the publication of its Performance

Measurement Standards; and this was followed shortly by the Investment Counsel Association of America (ICAA) in the early'70s, which also felt that time-weighted returns were superior to *money-weighted* returns. (Money-weighted returns are another name for Internal Rates of Return (IRR)). Here's an example of how cash flows can impact an IRR calculation:[2]

We invest one dollar to start. During the first year, we realize a 10% return. In year two, we achieve a return of 40 percent. No cash flows occur. Consequently, the value of the fund at the end of the first year is $1.10 and $1.54 at the end of the second year. The money-weighted ROR is found by solving for r in the following equation

$$1.00 - 1.54 / (1 + r)^2 = 0.$$

Doing this, we calculate an annual rate of return of 24.1 percent.

A second investor would be just like the first, with the exception that she makes a contribution of $1.00 at the beginning of the second year. So, she starts the second year with $2.10 and still gets a 40% return. This time, the formula reads:

$$1.00 + 1.00/(1+r) - 2.94/(1+r)^2 = 0.$$

Solving for *r*, she gets an annual ROR of 28.6 percent.

As you've seen, the manager benefited from the cash flow from the second investor, even though his sub-period performance hadn't changed. Since managers typically don't control cash flows, they're not entitled to improved (or lowered) returns from these cash flows. If instead of adding merely a single dollar, our client had added $10, his return for the two year period would have jumped to 36.71 percent. And yet, the manager's actual return for the two years remained 10% and 40 percent.

Recognizing this, the BAI and ICAA required the use of time-weighted returns. AIMR (now GIPS), too, has this as a requirement for account-level returns. The reason? Time- weighted returns aren't impacted by cash-flows!

But wait...

You'll soon see examples of situations when it appears that the cash flows actually impact the rate of return. Hopefully, you'll come to realize that it's not the cash flows that impact the return but the way the manager invested these flows.

As I mentioned above, I first encountered this problem when we were reporting client returns for 1987. Those accounts that made contributions just before the crash (I'm sorry, adjustment) ended up with returns that didn't seem to make sense. I, too, questioned some of them.

We brought in a consulting firm to advise us. Their response? That we were calculating correct returns and that if our clients didn't understand the results, it was because they didn't understand performance. As you can imagine, this explanation didn't go over very well. We needed a better answer.

MONEY-WEIGHTING VERSUS TIME-WEIGHTING

With time-weighted returns, we don't allow the size of the assets to influence the return. Time-weighted returns show the value of one dollar invested in a

portfolio while money-weighted returns show an average return of all dollars in the portfolio for the period. With our earlier IRR example, we saw that the portfolios with the larger sums in the second period achieved significantly better returns.[3]

Some Examples of Unusual Returns

Our first example (A - see Table 1) presents an interesting situation. The portfolio started with a single security (1,000 shares of STAR valued at $1 per share for a total market value of $1,000). On July 1, this security had increased by a phenomenal 9,900 percent. At that point, the client invested an additional $1 million, with which the manager purchased 1,000 shares of DOG at $1,000 per share. At year-end, the portfolio value had dropped considerably. While STAR's share price remained unchanged, DOG dropped to $100. The return for the second half of the year was -81.82 percent. Geometrically linking the two periods, we see the return for the year was 1,718 percent. (Please refer to Exhibit 1 for the calculations).

Now, doesn't this cause you to pause and question these numbers, even just a little? Our client gave us a total of $1,001,000 during the year (an initial $1,000 followed by a contribution of $1 million). Her portfolio at yearend was only worth $200,000, meaning she lost $801,000. And we claim a 1,718.18% return? Intuitively, we'd probably expect a huge negative return, not an outstandingly positive one.

Table 1 – Example A

	Activity	Position	Segment Values
January 1		1000 STAR @ $1/share	$1,000
July 1	Purchase 1000 DOG @ $1,000/share	1000 STAR @ $100 1000 DOG @ $1,000	$1,100,000
December 31		1000 STAR @ $100 1000 DOG @ $100	$200,000

**Exhibit 1 - Return Calculations
(for Table 1 - Example A)**

Formula Used:

ROR = (EMV / BMV - 1) * 100

Where ROR = Rate of Return
EMV = Ending Market Value ($100,000) BMV = Beginning Market Value ($1,000)

January 1 - July 1:

ROR = ((100,000 /1000) - 1) * 100 = 9,900%

July 1 - December 31:

EMV = $100,000
BMV = $1,100,000

ROR = ((200,000 / 1,100,000) - 1) * 100 = -81.82%

January 1 - December 31:

Geometrically link ROR and ROR

{[(9,900% / 100) - 1] * [(-81.82% / 100) - 1] + 1} * 100 = 1,718.18%

Let's back up for a moment. What are we measuring, the performance of the manager or the net change in assets? Could the manager control the client's decision to invest a mere $1,000 when he was doing so well, and to hand over $1 million just at the wrong time. (Where was that $1 million at the beginning of the year? Surely not making a 9,900% return!)

Had we chosen to measure the return using the internal rate of return (*i.e.,* calculate a money-weighted rate of return) rather than a time-weighted return, we'd get -80 percent.

When we use a time-weighted return, we're measuring the manager's investment acumen, regardless of the amount of money invested. A 9,900% return linked with a -81.82% return will <u>always</u> yield a 1,718.18% return, independent of the amount of money in the two time periods.

Let's modify Example A (please refer to Table 2). Here, our client gave us $1 million at the start. We purchase 1 million of STAR at $1 per share on January 1 for an investment of $1 million. On July 1, STAR has increased in value to $100 and our portfolio is worth $100 million (my, how happy our client is).

The client wants to withdraw some of her new-found wealth, so we sell 999,000 shares of STAR, leaving 1,000 shares valued at $100 for a market value of $100,000. The 999,000 shares sold raises $99,900,000. Of this, the

client withdraws $98,900,000. The $1 million remaining is used to purchase 1,000 shares of DOG at $1,000 per share.

Well, December 31st comes and STAR remained flat but DOG was not our idea of a *best friend*, and ended the year at a lousy $100. The portfolio is only worth $200,000, so our client lost $900,000 during the latter part of the year.

		Activity	Position	Segment Values
		Table 2 – Example B		
January 1			1,000,000 STAR @ $1	$1,000,000
July 1			1,000,000 STAR @ $100	$100,000,000
July 1		Sell 999,000 shares of STAR $98,900,000 withdrawal Purchase 1000 DOG @ $1,000/share	1,000 STAR @ $100 1000 DOG @ $1,000	$1,100,000
December 31			1000 STAR @ $100 1000 DOG @ $100	$200,000

As in Example A, the return for the year is 1718.18 percent. But this time, our client has a net gain of over $99 million. (I don't think she will be <u>that</u> upset about the 81.82% drop in the last six months, do you?)

So, what's the difference between A and B? **<u>Answer:</u>** the dollar amount invested.

Did the manager do anything differently between A and B? No.[4] He had the same six-month return at the beginning of the year (9,900.00%) and the same return for the second half (-81.82%).

Will the two clients behave any differently when they receive their annual statements claiming a return of 1,718.18 percent? Probably.

Client A will say, "Are you crazy? I lost a bundle! How can you report a positive return?!?!" Client B, may ask, "Is that all? Surely, you're understating your phenomenal success!" And they'll both be wrong.

The manager's performance is based on the rates of return—<u>not</u> on the net dollars raised or lost.

What Are Time-Weighted Returns Measuring?
What Are Money-Weighted Returns Measuring?

So, what's the problem? Are we missing something or is there a problem with the time-weighted return methodology? What are we attempting to measure with the time-weighted return?

When we calculate a rate of return, we want to know how our manager performed, regardless of the amount of money invested. In theory, managers have little control over the amount of money they manage.[5] Whatever amounts they have, they do their best to provide a level of appreciation within the constraints of their investment style, mutual fund prospectuses, and/or client requirements and restrictions.

Time-weighted returns don't worry about the amounts invested from one period to the other.

Rather, they look at what was done with the money there, regardless of the amount.

And managers, too, don't report their performance any differently when they have more money or less.[6] We don't see a mutual fund trying to differentiate one period's return with another, based on the amounts invested or the net proceeds generated as a result of their investing.

In general, the manager doesn't control the cash flows. At the start of each period, he has a certain amount of money to work with. His performance should be based on what he does with this money – not the amount that's been appreciated or depreciated from it. If, in period one his return is a marvelous 40.55%, which is then followed by a disappointing -21.98%, the rule says to geometrically link the two returns and accept the result (9.66%), not to look at the dollars involved. If we achieve an unbelievable 9,900% return, which is then followed by a drop of 81.82%, then we shouldn't be surprised when we see 1,718.18% for the year.

Our clients, obviously, tend to focus on the dollars. This was especially noticeable in 1987 (although it's still common today). The thousands of investment clubs that have been started (*a la* the Beardstown Ladies) probably have little or no understanding of performance measurement. They think more along the lines of money-weighting (which may be appropriate, given that they make the decisions as to how much to invest). But do they calculate a rate of return? It's doubtful. They probably look at the net amount of their investments.[7]

Our clients often do the same thing. They look at their initial investment, plus or minus cash flows, and compare it with their present value. (So much for performance measurement.)

Money-weighted returns measure the performance of the controller of the cash flows. Don't we all wish we had more money invested in the stocks that do incredibly well and less on those that don't?

The person sitting at the blackjack table, who was just dealt a "21," wishes he had placed a bigger bet. Our clients can't fault us for having less invested when the market is doing well and more when it's not. The manager can only be measured on his performance with what he has been given.

WHICH METHOD IS RIGHT FOR SUB-PORTFOLIO LEVEL RETURNS

Time-weighted returns negate the effects of cash flows. But what if the manager controls the cash flows?

Isn't that what happens with sub-portfolio returns (*e.g.,* asset class, industry sectors, investment themes)? Doesn't the manager (or management team) decide when money should be shifted from one group to another?[8]

Time-weighted returns show the value of one dollar invested in a portfolio or sector for the entire period, while money-weighted returns show an average return of all the dollars in the portfolio or sector for the period. The money-weighted return reconciles the beginning dollar plus cash flows with the ending value. Time-weighted returns ignore cash flows and only look at the money that's in the fund during the period.[9]

I recommend that when the manager makes these asset allocation decisions, the sub-portfolio returns be derived using a money-weighted return (*i.e.,* internal rate of return). Here, the effect of cash flows should be felt by the derived return. However, if the manager retains only partial discretion, both time and money weighted returns should be illustrated.

CONCLUSION

When you encounter unusual or questionable time-weighted returns, try to disengage yourself from the money values and focus on the sub-period returns. Do they make sense? If so, then the linked return is probably correct (assuming the formula is accurate).

But also consider whether time-weighted returns are the appropriate measurement. If they are, great! But think about providing a money-weighted return, too, that reflects the performance of the controller of the cash flows!

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We hope you found this short paper of value. If you have any questions or needs related to performance measurement, attribution, GIPS or risk please contact Chris Spaulding at CSpaulding@ SpauldingGrp.com (732-873-5700). We would love to talk with you.

ENDNOTES

1. Lerit, Steven J. "A Primer on Time-Weighted and Dollar-Weighted Returns," *The Journal of Performance Measurement*, Fall 1996.

2. Spaulding, David. Measuring Investment Performance: Calculating and Evaluating Investment Risk and Return, McGraw-Hill, pages 21-22

3. Had our client started with $100, and after achieving a 10% return for the first year (bringing their investment to $110) decided to take out $108.90 at year end, leaving $1.10 for the second year (as our earlier example had), he only would have had a two-year return of 10.30% (quite a drop from the other examples).

4. The withdrawal of $98,900 in "A" was so the client would end the year with the same amount and have the same second-half performance as A.

5. Obviously, a manager may be part of the marketing team, working to increase assets under management. And, the manager's track record clearly contributes to the amount of assets the team controls. However, it's still the client who makes the decision to turn their assets over to the manager to invest.

6. Although we recognize that larger sums can make investing difficult for certain investment approaches, while small sums can create challenges for others.

7. Calmetta Coleman's article in the February 27, 1998 *Wall Street Journal* ("Beardstown Ladies add Disclaimer to that Warm Tale") suggests that the return they did calculate very well may have been erroneous! And we've since learned, was erroneous.

8. Granted, there may be times when the client is influencing this decision. Here, I'm discussing the case where the manager or management team is making that call.

9. Williams, Arthur. "Measurement and Comparison of Investment Performance," *The Financial Analyst's Handbook*, 2d ed., Sumner N. Levine, ed (Homewood, IL: Dow Jones-Irwin, 1988).