moser@ziel.at

Ziel Invest GmbH, Mittersteig 13, A-1040 Wien, Austria
Tel. (+43-1) 587 10 80, Fax (+43-1) 587 10 80/19

Professional Standards and Advocacy

Association for Investment Management and Research

P.O. Box 3668

Charlottesville, Virginia 22903

USA

Wien, 19. September 2002

Re: **GIPS Guidance Statement**

Issues considered in my comment:

Are all areas of rate of return and asset-weighted composite calculation sufficiently covered in this Guidance Statement?

Are there other areas of calculation methodology that should be addressed in this Guidance Statement?

Standards reviewed in my comment:

Guidance Statement on Calculation Methodologies

Standard 2.A.2: "Time-weighted rates of return that adjust for cash flows must be used. Periodic returns must be geometrically linked. Time-weighted rates of return that adjust for daily-weighted cash flows must be used for periods beginning 1 January 2005. Actual valuations at the time of external cash flows will likely be required for periods beginning 1 January 2010."

1. Time-weighted rate of return

$$(1+R_{TR}) = \frac{MV_1}{BMV} \times \frac{MV_2}{MV_1+F_1} \times \ldots \times \frac{MV_{n-1}}{MV_{n-2}+F_{n-2}} \times \frac{EMV}{MV_{n-1}+F_{n-1}}$$

The time-weighted rate of return depends only on the beginning and ending market values, on the cash flows, and on the market values on the days with cash flows. The period is divided into sub-periods on the days with cash flows (1, 2, …, *n*-1). TWRR does not depend on the lengths of time of the sub-periods. In this sense it is not "time-weighted". In my opinion "time-weighted" does not mean anything in this calculation, the words are just used to differ TWR from MWR. The portfolio values on the days without cash flows do not alter TWRR.

The Excel sheet TWR in the file AIMRCalx.xls enclosed shows the exact TWRR-calculation of *Example 1* in the *Guidance Statement*. You can write any date in the period [01/31/98, 02/28/98] over 02/16/98 getting the same TWRR. You can convert 03/22/98 into any day in March or into 02/28. Change the market values of the portfolio on the days without cash flows 01/31 and 02/28 and see no influence on TWRR.

2. Why Dietz, Modified Dietz and Modified BAI?

The Dietz Methods were invented to provide a shortcut for the long iterations we need solving the IRR-equation, when manual calculation is required. IRR is the money-weighted rate of return. Both Dietz Methods are approximation procedures for MWR and do not have the most important characteristic of TWRR, that the returns of periods can be geometrically linked (multiplied). But like all MWRs the Dietz returns have the comfortable attribute that they don't depend on the market values of the portfolio on the days with cash flows. The TWR depends on a sequence of cash flows and portfolio-values. The MWR depends on a sequence of cash flows and calendar days.

The days of manual calculation are over since 30 years at least. So there is no use to use Dietz Methods. Most users of TWRR don't know market values of their portfolios on all days with cash flows. So they can use MWR for short sub-periods with no market values. But it makes no sense to use approximations for MWR like the Dietz Methods.

I could not find any difference between Modified BAI and standard IRR-calculation like in Microsoft Excel except some minor algebraic sign conventions. Sheet *ModIRR* in *AIMRCalc.xls* shows that both methods deliver the same results. BAI iterates with Excel's search of the adequate R, which makes the target value of "Error" zero.

In *Guidance Statement* the letters *W* in the formula

$$EMV = \sum_{i=0}^{n} F_i (1+R)^{W_i}$$

On page 6 suggest that the W_is are time-weights. But I have not seen weights in the exponent yet. $(1+R)^{W_i}$ are the weights and they do not have the dimension time.

2.1 Multiple Solutions for IRR?

Guidance Statement, page 6: "The Modified IRR Method has the additional disadvantage of requiring an iterative process solution and is thus less desirable than the Modified Dietz Method when manual calculation is required. It is also possible to have multiple answers if there are both positive and negative cash flows."

I remember a sentence about so called "isolated realisable investments" (German: "isoliert durchführbare Investitionen"). Definition: An investment is isolated realisable, if the time value of the investment calculated with the internal rate of return is greater than or equal to zero at any time. All security portfolios are isolated realisable. These isolated realisable investments have one important property: The number of solutions for IRR in the interval (-1, ∞) is maximal 1. If the is one solution in the interval, which we can interpret as rate of return, this solution is unique.

3 Approximations for TWRR

Problem:

Number	Calendar day *d*	Cash flow *F*	Portfolio's market value *MV*	Benchmark *B*
i-1	known	known	known	known
i	known	known	not known	known
i+1	known	known	known	known

$F_{i\text{-}1}$ and F_{i+1} can be equal to zero.

3.1 Without Benchmark

The portfolio is managed without benchmark. We combine the two sub-periods [*i*-1, *i*] and [*i*, *i* +1] into one sub-period [*i*-1, *i*+1]. Then we estimate the unknown portfolio's value MV_{ie} on day d_i with the internal rate of return or with the modified IRR method in the sub-period (*i*-1, *i*+1)giving R. From the beginning of the sub-period the market value $MV_{i\text{-}1}$ develops with the money-weighted R to the estimated MV_{ie}.

$$MV_{ie} = MV_{i-1} \times (1+R)^{W_i - W_{i-1}}$$

Example 1 in the *Guidance Statement* is solved in Excel sheets *ModIRR* and *TWRa1* in file *AIMRCalc.xls*.

3.2 With Benchmark

If the portfolio is managed with benchmark we know the "price" of the Benchmark B_i on day d_i. We can estimate the unknown value MV_{ie} on day d_i with the TWRR of the Benchmark in the sub-period [*i*-1, *i*].

$$MV_{ie} = MV_{i-1} \times \frac{B_i}{B_{i-1}}$$

This method is called ***Analyst test*** in The WM Company: *WM Performance Glossary of Terms*, brochure without date from The World Markets Company, Grueneburgweg 16, D-60322 Frankfurt am Main, Germany.

Example 1 in the *Guidance Statement* is solved with Analyst test in Excel sheets *Ana.Test* in file *AIMRCalc.xls*.

4. Daily Valuation Method

Guidance Statement, page 9, Example 2

The time-weighted rate of return depends only on the beginning and ending market values, on the cash flows, and on the market values on the days with cash flows. It does not depend on the market values on days with cash flow equal to zero (without cash flow) like 01/31/00 and 02/28/00. Please see Excel

sheet *Example2*. The TWRR with Excel 7.55 % differs slightly from your number 7.48 %. Many multiplications and divisions can be a source of numerical errors in final result.

5. Composites

Guidance Statement, page 11:

"The objective in calculating the composite returns is to use a method that will produce the same value as if the assets of all the individual portfolios in the composite were aggregated and a return is calculated for one 'master portfolio.'"

Page 12 f, Application

The example shows the market values of both portfolios on both days with cash flows 01/10 an 01/22. Therefore it is possible to calculate the exact TWRR with daily valuation method according to your cited statement on page 11. There is no need for approximations.

See Excel sheet *Composite*. Please notice that I get slightly different returns for portfolio1: 11.37 % (11.32 %) and portfolio 2: 8.30 % (8.26 %).

Summary

1. Please don't propagate Dietz Method and Modified Dietz Method. They are of little use since the invention of computers.
2. For solving the problem of missing market values I strongly recommend the Analyst Test.

Friedrich Moser, Ziel Invest GmbH, Vienna, Austria