Understanding Mutual Fund Rates of Return

This document outlines the two primary methods for calculating the rate of return on an investment: time-weighted rate of return and money-weighted rate of return. It will help you understand the key differences between these two methods and answer any questions that your clients may have.

1. **Time-weighted rate of return (TWRR)** considers only the change in the investment's market value over a specific time period. The timing of cash flows determines where time periods begin and end, and an investor's decision to contribute or withdraw from the portfolio does not affect the return. The TWRR isolates the portfolio's performance and allows for comparisons across portfolios, making it a better reflection of the decisions made by the portfolio manager over the period.
2. **Money-weighted rate of return (MWRR)*** measures how the value of an investment has changed over time. This calculation considers the fund's performance along with the size and timing of cash flows. As cash flows are unique to each investor, MWRR is a good measure of an individual investor's performance.

In the absence of cash flows (contributions or withdrawals), the MWRR is equal to the TWRR.

How cash flows affect TWRR and MWRR

Consider this example as a hypothetical scenario:

An investor makes equal contributions of $2,000 at the beginning of years 1 to 4. Given four straight years of positive performance, the decision is made to close another account held at a different financial institution and consolidate $20,000 into this account at the beginning of year 5. In the fifth year, the portfolio value declines by 10%. The investor's experience is summarized in the following table:

Hypothetical investor experience

Date	Performance	Contribution amount†	End-of-year market value	Annual gain/loss
Year 1	7.0%	$2,000	$2,140	$140
Year 2	8.0%	$2,000	$4,471	$331
Year 3	9.0%	$2,000	$7,054	$583
Year 4	6.0%	$2,000	$9,597	$543
Year 5	-10.0%	$20,000	$26,637	$(2,960)

†Contribution at the beginning of the year

The sizeable contribution at the beginning of year 5 adds a substantial amount of capital to the account just before a 10% decline. Since the decline takes place on a larger capital base, it overwhelms the previous four years of positive returns, resulting in the ending market value being less than the total invested capital ($26,637-$28,000 = -$1,366).

The MWRR in this example is -2.91%, while the TWRR is 3.74%. Refer to the equations on the following page to see how these are calculated.

How are these returns calculated and what accounts for the difference?

The difference is the treatment of cash flows

TWRR – Cash flows, either as contributions, redemptions or distributions, mark the beginning of a new period. In the example provided, there is only one cash flow event at the beginning of each year, so the sub-period is an entire year. However, multiple sub-periods within a year or within a quarter are possible. Returns for each sub-period are given equal weighting and all sub-periods are linked together to determine the TWRR for the year. Similarly, returns for the month could be linked together to determine the quarterly TWRR, and all quarterly TWRR could be linked together to determine the annual TWRR.

As TWRR equally weights performance over all periods of time, the cash flow decisions made by the investor, such as the timing and size of contributions or redemptions, are not factored into the results.

In this case, since the sub-periods are already in years, they just need to be linked together and annualized to determine the TWRR. The loss in year 5 wipes out all of the previous gains, but since each sub-period is equally weighted, it only accounts for 20% of the return calculation. As four of five periods have positive returns, the overall return is positive.

TWRR Equation

$$\begin{aligned} TWRR &= \left((1+return_1)\times(1+return_2)\times(1+return_3)\times(1+return_4)\times(1+return_5)\right)^{1/5} - 1 \\ &= \left((1.07)\times(1.08)\times(1.09)\times(1.06)\times(.90)\right)^{1/5} - 1 \\ &= 3.74\% \end{aligned}$$

MWRR – This method differs from TWRR in that the calculation can be impacted by the timing and size of cash flows, as well as the account's performance over time.

To calculate MWRR, the present value of all cash flows and the terminal value must equal zero. The rate of return that makes this true is the MWRR.

The formula below illustrates this:
MWRR is the rate of return where present value of outflows + present value of inflows = 0

In this case, a large contribution was made just before a steep negative return in the fifth year. The size of this loss offsets all previous gains, resulting in a negative MWRR.

MWRR Equation

$$\text{Initial Cash Flow} + \frac{(\text{cash flow}_1)}{(1+\text{return})^1} + \frac{(\text{cash flow}_2)}{(1+\text{return})^2} \cdots + \cdots \frac{(\text{cash flow}_N)}{(1+\text{return})^n} = 0$$

$$-2{,}000 + \frac{(-2{,}000)}{(1+\text{return})^1} + \frac{(-2{,}000)}{(1+\text{return})^2} + \frac{(-2{,}000)}{(1+\text{return})^3} + \frac{(-20{,}000)}{(1+\text{return})^4} + \frac{(26{,}637)}{(1+\text{return})^5} = 0$$

The rate of return that produces a zero value is -2.91%. Inserting -2.91% into the formula above results in:
-2,000 - 2,060 - 2,122 - 2,185 - 22,508 + 30,875 = 0

The above equations are based on the hypothetical example from the previous page.

Summary: Comparison of TWRR and MWRR

Both TWRR and MWRR are valid measures of investment performance. The key differences and primary uses of each are outlined below.

	TWRR	MWRR
Cash flows	Are not factored into returns	Timing and size of cash flows influence returns
What is measured?	Performance of the market value of an investment over a specific time period	The performance of the investment and the impact of client cash flow decisions
Used to gauge	Investment manager's decision making and performance	Client's individual performance

All published mutual fund rates of return, including RBC client statements, are calculated using TWRR. For details on how to calculate TWRR please refer to: rbcroyalbank.com/return

* Money-weighted rate of return is also commonly referred to as dollar-weighted rate of return.

RBC Global Asset Management

FOR ADVISOR USE ONLY

96880 (04/2016)
015GAM109_96880 (04-2016)_UNDERSTANDING_MF_RETURNS_EN_V1_1_FNL 04/18/2016