



# TWRR and MWRR

## At a Glance

Although measuring the return of an investment portfolio would seem like a simple matter, this isn't exactly the case. Not only can the math be a bit intimidating, but there is actually more than one way of measuring it. And, in many situations, the results will not be the same, depending on the method chosen. Confused? We don't blame you. But read on. Hopefully we can clear up this confusion and help you understand which approach is the best, depending on the use to which you intend to put the result.

## Two Methods – For Two Distinct Purposes

The two main ways of calculating investment performance are **Time-Weighted Rate of Return (TWRR)** and **Money-Weighted Rate of Return (MWRR)**. The only significant difference between the two is how they treat amounts added to or taken out of the portfolio – TWRR excludes them from the rate of return calculation whereas MWRR includes them.



	Pros	Cons
 TWRR	<ul style="list-style-type: none"> <li>Results can be directly compared with benchmarks, mutual funds and other managed products</li> <li>The only measure to use to evaluate the relative performance of a portfolio manager</li> </ul>	<ul style="list-style-type: none"> <li>The result may not give an exact measure of how your portfolio has evolved in value</li> </ul>
 MWRR	<ul style="list-style-type: none"> <li>A measure of your unique investment experience</li> <li>The measurement to use when comparing your results with a targeted rate of return to reach a personal financial objective</li> </ul>	<ul style="list-style-type: none"> <li>Cannot be compared to benchmarks – MWRR is unique to a particular portfolio</li> <li>Does not allow an evaluation of the portfolio manager or investment product's performance</li> </ul>

## Two Useful Tools Made Available to You

It has often been said that the money-weighted approach is the “investors’ way” of calculating return on investment, while the time-weighted approach is the “portfolio managers’ way” of calculating it. There is a lot of truth to this statement. But, the fact remains that, just as you must have both a hammer and a screw-driver in your tool box, the two rate of return calculation methods are also needed because they each fulfill different and equally important functions.

National Bank Investments Inc. uses both the Time-Weighted Rate of Return (TWRR) and Money-Weighted Rate of Return (MWRR) calculations:

- The **TWRR** is used to show the funds’ returns in various documents, such as Fund Facts.
- The **MWRR** is used to calculate the personalized return of your portfolio, included in your portfolio statements.

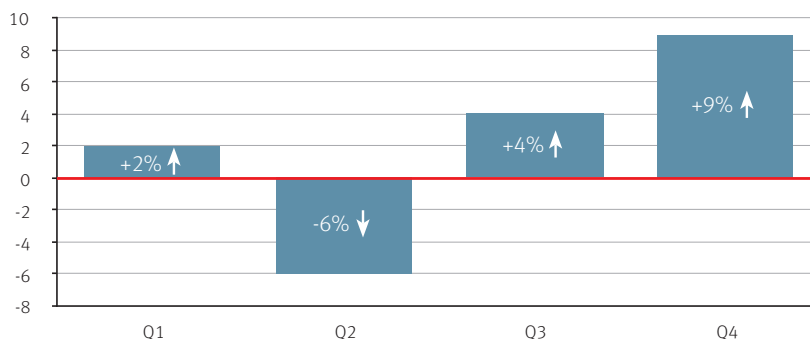
	Measures	Useful for
 TWRR	<ul style="list-style-type: none"> <li>Pure investment performance not taking into account cash flow</li> </ul> Included: interest, dividends, and realized capital gains Excluded: deposits, withdrawals and transfers	<ul style="list-style-type: none"> <li>Evaluating a portfolio manager</li> <li>Comparing performance with that of other managed products</li> </ul>
 MWRR	<ul style="list-style-type: none"> <li>Performance of the actual cash invested taking into account all types of cash flow</li> </ul> Included: interest, dividends, realized capital gains, deposits, withdrawals, and transfers	<ul style="list-style-type: none"> <li>Evaluating your actual investment experience</li> <li>Comparing your results to a targeted rate of return to reach a personal financial objective</li> </ul>

## TWRR and MWRR at Work – A Practical Example

Let us introduce our example by reminding you that investment performance is far from linear – a reasonable portfolio return is often the sum of many market movements up and down.

Investor A	Investor B	Investor C
<ul style="list-style-type: none"> <li>Invests \$100,000 on January 1.</li> <li>On March 31, Investor A realizes a Q1 2% gain, for a balance of \$102,000.</li> <li>In Q2, Investor A suffers a 6% portfolio loss, resulting in a June 30 value of \$95,880.</li> <li>Investor A enjoys a 4% Q3 gain and a 9% Q4 gain for a total year-end portfolio value of \$108,690.</li> </ul>	<ul style="list-style-type: none"> <li>Also invests \$100,000 on January 1.</li> <li>On March 31, Investor B realizes a Q1 2% gain, for a Q2 starting balance of \$102,000.</li> <li>In Q2, Investor B suffers a portfolio loss of 6%, and also must withdraw \$20,000 for house repairs, leaving a balance of \$75,880 to start Q3.</li> <li>Investor B enjoys a 4% Q3 gain and a 9% Q4 gain, resulting in a year-end portfolio valued at \$86,018.</li> </ul>	<ul style="list-style-type: none"> <li>Also invests \$100,000 on January 1.</li> <li>Q1 brings a 2% gain and Q2 produces a loss of 6% for a June 30 value of \$95,880.</li> <li>Investor C invests a \$20,000 inheritance in the same portfolio at the start of Q3.</li> <li>Investor C also enjoys a 4% Q3 gain and a 9% Q4 gain, resulting in a year-end portfolio valued at \$131,362.</li> </ul>

Quarterly Performance in a Fluctuating Market



Now let's examine and compare the Time-Weighted Rate of Return and the Money-Weighted Rate of Return for each of our three Investors.

	Investor A	Investor B	Investor C
Q1	\$100,000	\$100,000	\$100,000
Q2	← No Deposits or Withdrawals →		
Q3	—	(\$20,000)	+\$20,000
Q4	← No Deposits or Withdrawals →		
End Value	\$108,690	\$86,018	\$131,362
Gain	\$8,690	\$6,018	\$11,362
TWRR	8.7%	8.7%	8.7%
MWRR	8.7%	6.33%	10.84%

Investor A	Investor B	Investor C
<p>From a time perspective, the total annual return of this portfolio is 8.7%, and, since there was no cash flow during the year, the money-weighted return is also the same at 8.7%.</p>	<p>The time-weighted return is still 8.7%, because TWRR measures the growth of \$1 from the beginning to the end in the same investment as if there were no cash flows. However, Investor B's MWRR is 6.33%, given that the gain was \$6,018 in the period.</p> <p>Both TWRR and MWRR have provided B with useful information – the former telling how well the investment choices performed, and the latter how well the actual money put into this investment did, the difference being the impact of a big outflow happening at an unfortunate time.</p>	<p>The time-weighted return is still 8.7%, because TWRR measures the growth of \$1 from the beginning to the end in the same investment as if there were no cash inflows. However, Investor C's MWRR is 10.84%, given that the investment gain was \$11,362 in the period.</p> <p>Both TWRR and MWRR have provided C with useful information – the former telling how well the investment choices performed, and the latter how well the actual money put into this investment did, the difference being the impact of a big deposit happening at a lucky time.</p>

## MWRR – Money-Weighted Rate of Return

### What Is It?

A weighted rate of return, calculated according to a standard method for the entire financial sector known as a “money-weighted rate of return” (MWRR), will show you exactly how your investment portfolio has performed, taking all factors impacting it into account, since it includes the timing of any deposit or withdrawal you have made.

### What Is MWRR Used For?

Your money-weighted rate of return is unique to your portfolio, since it incorporates the impact of the timing and size of cash flows you initiate into and out of your portfolio.

Therefore, MWRR must not be used to compare with performances published for indices and managed products. But, it has other very important uses. When you have targeted a specific amount of savings to accumulate, it's your money-weighted return that identifies how quickly you will get there.

Also, the scenarios incorporated into a financial plan are based upon a rate of return assumption. Comparing your MWRR with this rate of return assumption will tell you whether you are on track to reach your goal in the timeframe you had anticipated.

### Factors Impacting Your Money-Weighted Rate of Return

- ▶ The timing of when you make deposits to, withdrawals from and transfers into or out of your portfolio.
- ▶ Additions to or withdrawals from your account at certain moments will impact your return, due to market fluctuations during these transactions.

### Putting Your MWRR in Context

Your money-weighted rate of return is a function of the mix of investments and risk level of your portfolio based on your investor profile, as well as the timing and amounts that you add or withdraw from the portfolio.

It is the measurement to use for determining how well you are doing in terms of the rate of return associated with achieving a personal financial goal – not for comparisons with indices or for evaluating your portfolio manager.

### Methodology

MWRR is determined using an internal rate of return (IRR) calculation. Over the period measured, your portfolio will have beginning and ending values, as well as cash flows in (interest, dividends, realized capital gains, deposits, transfers in) and out (withdrawals, transfers out).

An MWRR computation involves applying the formula in the shaded area and solving for the missing factor – the IRR. This is best done with a financial calculator, since otherwise you will have to use a trial and error approach which could require numerous iterations. MWRR is typically calculated using trade-date valuations, including fees.

#### How to Calculate MWRR

First, calculate a daily rate by solving for  $IRR_d$  in the following formula:

$$TVB = \frac{TVE}{(1 + IRR_d)^n} + \left( \sum_{i=1}^{n-1} \frac{-CF_i}{(1 + IRR_d)^i} \right)$$

Where:

TVB = Total account value at the beginning of the period

TVE = Total account value at the end of the period

$IRR_d$  = Daily average internal rate of return for the period

$CF_i$  = Net value of cash flows on the given date

n = Total number of days

i = Selected daily period

Then, convert the daily rate of return into a rate of return for the total period rate using:

$$IRR_{tp} = \left( (1 + IRR_d)^{365/n} \right) - 1$$

Where:

$IRR_{tp}$  = Internal rate of return for the total period

$IRR_d$  = Daily average internal rate of return for the period

n = Number of days in the period



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