# Personal Rates of Return
## Detailed Explanation of Calculation

The personal rate of return found in your statement is a time-weighted rate of return that uses your portfolio's daily market values whenever a cash flow occurs. The daily valuation time-weighted rate of return is the most accurate method to calculate returns in comparison with other approximation methods, such as the Modified Dietz method and the Modified Bank Administration Institute (BAI) method (which are also time-weighted rate of return formulas recommended by the Association for Investment Management and Research (AIMR) Performance Presentation Standards Handbook 1997). The Investment Funds Institute of Canada (IFIC) stated in IFIC Bulletin #21 Revised (October, 2000) that, as of June 30, 2003, the daily valuation methodology is the only preferred formula.

The formula for the time-weighted rate of return with daily valuation is as follows:

$$R = \frac{MVE}{MVB} - 1$$

where:

MVE is the market value of the portfolio at the end of the current period before any cash flows in the period but including any income (reinvested distributions) in the current period, and

MVB is the market value of the portfolio at the end of the previous period (the beginning of the current period) including any cash flows at the end of the previous period and any accrued income to the end of the previous period.

### Geometric Linking

The daily or sub-period returns are geometrically linked together to arrive at the month's rate of return. The linking formula is:

$$(1 + S_1) \times (1 + S_2) \times \ldots (1 + S_n) - 1$$

where:

$S_1$ is the first daily or sub-period return for the month,

$S_2$ is the second daily or sub-period return for the month, and

$S_n$ is the last daily or sub-period return for the month.

The same geometric linking formula is used when calculating quarterly, year-to-date, 1-year, or cumulative rates of return by substituting the daily returns with monthly returns.

### Sample Calculation

| | | |
|---|---|---|
| **Market value, beginning of month** | **=** | **$500,000** |
| 10th of month, contribution | = | $25,000 |
| Value of account before cash flow | = | $502,000 |
| Value of account after cash flow | = | $528,000 |
| 20th of month, contribution | = | $25,000 |
| Value of account before cash flow | = | $527,000 |
| Value of account after cash flow | = | $552,500 |

| **Market value, end of month** | | | = | **$554,000** |
|---|---|---|---|---|
| $R_{1-10}$ | = | (502,000 / 500,000) – 1 | = | 0.0040 or 0.40% |
| $R_{10-20}$ | = | (527,000 / 528,000) – 1 | = | -0.0019 or -0.19% |
| $R_{20-30}$ | = | (554,000 / 552,500) – 1 | = | 0.0027 or 0.27% |

$R_m$ = (1 + .0040) x (1 + -.0019) x (1 + .0027) – 1 = 0.0048 or 0.48%

Thus, the rate of return for the sample one-month period is 0.48%.

### Annualized Returns

Annualized returns express the rate of return of a portfolio over a given time period on an annual basis, or a return per year.

Below are examples of how to arrive at 1-year annualized, 3-year annualized and since inception returns for data comprising of monthly or quarterly returns for the period ending June 30, Y4.

**Note that the annualized returns are moving numbers depending on the reporting period. Also, rates of return for periods less than one year should not be annualized.**

### Examples:

*1. Monthly Data*

| **Months** | **Y1** | **Y2** | **Y3** | **Y4** |
|---|---|---|---|---|
| January | | -1.20% | 2.05% | -1.63% |
| February | | 7.21% | -6.53% | -0.29% |
| March | | 4.64% | -3.87% | 3.15% |
| April | | 0.03% | 4.55% | -2.97% |
| May | | 0.73% | 0.72% | -1.19% |
| June | 0.96% | 3.29% | -4.48% | -5.73% |
| July | 1.01% | -0.52% | -1.01% | |
| August | -1.77% | 4.53% | -3.14% | |
| September | -0.13% | -2.58% | -7.93% | |
| October | 3.49% | -1.79% | 1.72% | |
| November | 3.74% | -5.88% | 6.09% | |
| December | 11.52% | 1.71% | 3.19% | |

1-Year Annualized Return:

Step 1: Geometrically link the monthly returns from July Y3 to June Y4 (but do not deduct 1) to obtain a compounded return of 0.898854

Step 2: Calculate the annualization factor 12/n = 12/12 = 1

Step 3: 1-year annualized return = (0.898854)^(1) - 1 = -0.101146 or -10.11%

3-Year Annualized Return:

Step 1: Geometrically link the monthly returns from July Y1 to June Y4 (but do not deduct 1) to obtain a compounded return of 1.080179

Step 2: Calculate the annualization factor 12/n = 12/36 = 0.333333

Step 3: 3-year annualized return = (1.080179)^(0.333333) - 1 = 0.0260422 or 2.60%

*2. Quarterly Data*

| Quarter | Y1 | Y2 | Y3 | Y4 |
|---|---|---|---|---|
| 1 | | 10.84% | -8.31% | 1.17% |
| 2 | | 4.07% | 0.58% | -9.62% |
| 3 | -0.92% | 1.30% | -11.73% | |
| 4 | 19.74% | -5.99% | 11.36% | |

1-Year Annualized Return:

Step 1: Geometrically link the quarterly returns from 3rd quarter Y3 to 2nd quarter Y4 (but do not deduct 1) to obtain a compounded return of 0.898854

Step 2: Calculate the annualization factor 4/n = 4/4 = 1

Step 3: 1-year annualized return = (0.898854)^(1) - 1 = -0.101146 or -10.11%

3-Year Annualized Return:

Step 1: Geometrically link the quarterly returns from 3rd quarter Y1 to 2nd quarter Y4 (but do not deduct 1) to obtain a compounded return of 1.080179

Step 2: Calculate the annualization factor 4/n = 4/12 = 0.333333

Step 3: 3-year annualized return = (1.080179)^(0.333333) - 1 = 0.0260422 or 2.60%

*3. Since Inception*

The portfolio's inception date was June 23, Y1 and the partial period return from June 23 to June 30, Y1 was 0.96%. There were 1,022 days from June 23, Y1 to June 30, Y4.

Step 1: Geometrically link all the monthly or quarterly returns, including the partial period return in June Y1 of 0.96% (but do not deduct 1) to obtain a compounded return of 1.0904996.

Step 2: Convert the days, months or quarters to obtain the yearly annualization factor using the following formulas:
Days = n/365; Months = n/12; Quarters = n/4

Step 3: In our example, we use days to obtain the yearly annualization factor = 1/(1,102/365) = 1/3.0191781 = 0.33121597

Step 4: Since inception return = (1.090496)^(0.33121597) - 1 = 0.029111 or 2.91%



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