

How are Rates of Return Calculated?

The returns posted every month by the Pension Administration & Counselling team are calculated using the time-weighted rate of return method. This method is a measure of the compounded rate of growth of the initial portfolio market value during the evaluation period, assuming that all cash distributions are reinvested in the portfolio. It is computed by taking the geometric average of the portfolio subperiod returns. The main feature of this method is that it eliminates the effect of varying cash inflows by assuming a single investment at the beginning of a period and measuring the growth or loss of market value to the end of that period.

How is it calculated?

$$TWR_n = \frac{MVE - MVB}{MVB}$$

Where:

TWR_n = Time-weighted rate of return for period n

MVE = Market value at the end of period n

MVB = Market value at the beginning of period n

How do you link the returns of several periods?

$$TWR_T = (1 + TWR_1) \times (1 + TWR_2) \times \dots \times (1 + TWR_n) - 1$$

Where:

TWR_T = Total return for the combined periods

Example 1 (Periods Smaller than a year):

Suppose the amount of December 2006 contributions were as follows:

Your contributions	\$ 50.00
University contributions on your behalf	<u>150.00</u>
TOTAL	\$200.00

Further, assume the member directed 50% of these contributions to the Diversified Bond Fund (\$100) and 50% to the Diversified Equity Fund (\$100). In the case outlined above, at December 31, 2006 the unit value of the Diversified Bond Fund was 139.223 and the unit value of the Diversified Equity Fund was 226.175. With \$100 allocated to each fund at December 31, 2006, the member would have purchased:

0.7183 units of the Diversified Bond Fund ($\$100/139.223$) and
0.4421 units of the Diversified Equity Fund ($\$100/226.175$).

By January 31, 2007 the unit values of these funds were 138.980 and 230.439 respectively. The relative change in the unit values represents the rate of return on the fund for the month of January. That is, the rate of the return for the month can be found using the following formula:

$$\frac{\text{Unit value at end of period}}{\text{Unit value at beg of period}} - 1 = \% \text{ return of the fund for the period}$$

e.g. $\frac{138.980}{139.223} - 1 = -.0017 = -.17\% = \text{return on Diversified Bond Fund for January}$

$\frac{230.439}{226.175} - 1 = .0189 = 1.89\% = \text{return on Diversified Equity Fund for January}$

Diversified Bond Fund:	0.7183 x 138.98 =	\$ 99.83
Diversified Equity Fund:	0.4421 x 230.439	<u>101.88</u>
TOTAL:		\$ 201.71

Example 2 (Periods Greater than a year):

When a period is greater than a year, it is customary to “annualize” the rate of return, in order to facilitate comparisons.

$$TWR_{Ann} = (1 + TWR_T)^{1/n} - 1$$

Where:

TWR_{Ann} = Annualized time-weighted rate of return

n = number of years in the total period

Assume that the unit value of the Diversified Equity Fund on December 31, 2002 was \$200.00 and that on December 31, 2007 it had increased to \$300.00. The annualized, five-year rate of return would be calculated as follows:

$$TWR_T = \frac{300}{200} - 1 = 50\%$$

$$TWR_{Ann} = (1 + 50\%)^{1/5} - 1 = 8.45\%$$