

Solution #45

Time-weighted return = 0%

Dollar-weighted return = Y

Use two equations and two unknowns to solve for Y.

Time-weighted Return i_T

Divide time period into subintervals for each time there is a deposit or withdrawal.

For each subinterval, calculate ratio of amt in the fund at the end of interval to amt in fund at beginning.

$$(1 + i_T) = \left(\frac{F_1}{F_0}\right) \left(\frac{F_2}{F_1 + C_1}\right) \left(\frac{F_3}{F_2 + C_2}\right) \dots$$

F = fund value
C = contribution

$$(1 + 0) = \left(\frac{12}{10}\right) \left(\frac{X}{12 + X}\right) \quad \begin{array}{l} 120 + 10X = 12X \\ X = 60 \end{array}$$

Dollar-weighted Return i_D

Fund Jan 1 + deposits during yr - withdrawals during yr + interest = Fund Dec 31.

$$F_{\text{final}} = F_0 (1 + i_D)^1 + X (1 + i_D)^{\frac{1}{2}}$$

accumulates 1 yr to reach the final fund

accumulates 6 months to reach final fund

$$X = 10(1+i_D) + X(1+i_D)^{\frac{1}{2}}$$

Since time period is within 1 yr, can use simple interest approximation.

$$X = 10(1+i_D) + X(1 + \frac{1}{2}i_D)$$

$$X = 10 + 10i_D + X + \frac{1}{2}X i_D$$

$$i_D = \frac{-10}{40} = -.25 \Rightarrow Y = -25\%$$

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