

# EXAM FM QUESTIONS OF THE WEEK

S. Broverman, 2006

## Week of January 9/06

A pension fund begins the year with a balance of \$10,000,000 .

The fund balance on March 31 is \$10,500,000.

On April 1 the fund receives a contribution of \$2,000,000.

The fund balance on June 30 is \$13,500,000.

On July 1 the fund makes a benefit payment of  $X$ .

There are no other contributions of benefit payments during the year.

The fund balance on December 31 is \$8,760,000.

The time-weighted rate of return for the year is found to be half of the dollar-weighted rate of return for the year. Find the dollar-weighted return for the year.

**The solution can be found below.**

## Week of January 2/06 - Solution

We denote the dollar weighted return by  $i$ . Then

$10,000,000(1+i) + 2,000,000(1 + \frac{3}{4}i) - X(1 + \frac{1}{2}i) = 8,760,000$  is the dollar-weighted equation, and

$\frac{10,500,000}{10,000,000} \cdot \frac{13,500,000}{12,500,000} \cdot \frac{8,760,000}{13,500,000 - X} = 1 + \frac{1}{2}i$  is the time-weighted equation.

The first equation can be written as  $X = \frac{3,240,000 + 11,500,000i}{1 + \frac{1}{2}i}$ .

The second equation can be written as  $\frac{9,933,840}{13,500,000 - X} = 1 + \frac{1}{2}i$ , which then can be written as  $X = \frac{3,566,160 + 6,750,000i}{1 + \frac{1}{2}i}$ .

Setting these two expressions for  $X$  equal results in the equation

$3,240,000 + 11,500,000i = 3,566,160 + 6,750,000i$ , from which we get  $i = .0687$ .

This is the dollar-weighted return. The time-weighted return is  $\frac{1}{2}i = .03433$ , and

$X = 3,895,894$ .