

EXAM FM QUESTIONS OF THE WEEK

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Week of March 13/06

At the start of 2003, the term structure for annual effective yield rates on zero coupon bonds is as follows: 1 year: 3.0% , 2 year: 3.3% , 3 year: 3.5% , 4 year: 3.8% , 5 year: 4.0% .

At the start of 2004, the term structure for annual effective yield rates on zero coupon bonds is as follows: 1 year: 3.5% , 2 year: 3.8% , 3 year: 4.0% , 4 year: 4.5% , 5 year: 5.0% .

At the start of 2005, the term structure for annual effective yield rates on zero coupon bonds is as follows: 1 year: 3.5% , 2 year: 3.8% , 3 year: 4.0% , 4 year: 4.5% , 5 year: 5.0% .

At the start of 2006, the term structure for annual effective yield rates on zero coupon bonds is as follows: 1 year: 3.2% , 2 year: 3.4% , 3 year: 3.8% , 4 year: 4.0% , 5 year: 4.0% .

A fund earns interest according to the following schedule of investment year rates and portfolio rates of interest.

Original Investment Year	Investment Year Rates			Portfolio Rate
y	y	$y + 1$	$y + 2$	$y + 3$
	i_1^y	i_2^y	i_3^y	i^{y+3}

In this schedule:

- i_1^y is the yield on a one-year zero coupon bond for year y
- i_2^y is the 1-year forward, one-year effective yield and i_3^y is the 2-year forward, one-year effective yield based on the term structure as of the start of year y
- i^{y+3} is the yield on a one-year zero coupon bond for year $y + 3$

An investment of \$1000 is made into the fund on January 1, 2003. Find the value of the investment on January 1, 2007.

The solution can be found below.

Week of March 13/06 - Solution

The interest rate earned for 2003 is i_1^{2003} .

This is the zero-coupon bond rate for 2003, which is 3.0%.

The rate earned for 2004 is the investment rate i_2^{2003} .

This is the one year forward, one year effective rate of interest based on the 2003 term structure.

This is $\frac{(1.033)^2}{1.03} - 1 = .036$.

The rate earned for 2005 is the investment rate i_3^{2003} .

This is the two year forward, one year effective rate of interest based on the 2003 term structure.

This is $\frac{(1.035)^3}{(1.033)^2} - 1 = .039$.

The rate earned for 2006 is the portfolio rate i^{2006} .

This is the one-year zero coupon bond yield for 2006, which is 3.2%.

The value of the investment on January 1, 2007 will be

$1000(1.03)(1.036)(1.039)(1.032) = 1,144.17$.