EXAM FM QUESTIONS OF THE WEEK

S. Broverman, 2005

Question 12 - Week of October 10

You are given the yield rates for the following bonds, each of which has an annual coupon of 10%:

Time to Maturity:	1 yr	2 yr	3 yr
Yield to Maturity:	4%	6%	9%

Find the yield on a 3-year zero-coupon bond.

The solution can be found below.

Question 12 Solution

Since coupons are annual, the 1-yr coupon bond is like a 1-year zero-coupon bond since there is a single payment of 1.1 for each dollar of face amount.

For a 1-dollar face amount, 2-year 10% coupon bond, the price based on the 6% yield rate will be $v_{.06}^2 + .1(v_{.06} + v_{.06}^2) = 1.073336$.
We know that the zero-coupon bond yield for a 1-year maturity is 4%. If the 2-year zero-coupon yield is i, then the bond value can also be written as $v_i^2 + .1(v_{.04} + v_i^2)$ which still must be 1.073336 . From this we can solve for i, $i = .060983$, the 2-year zero-coupon bond yield.

For a 1-dollar face amount, 3-year 10% coupon bond, the price based on the 9% yield rate will be $v_{.09}^3 + .1(v_{.09} + v_{.09}^2 + v_{.09}^3) = 1.025313$.
We know that the zero-coupon bond yield for a 1-year maturity is 4% and for a 2-year maturity we have found it to be 6.0983%. If the 3-year zero-coupon yield is j, then the bond value can also be written as $v_j^3 + .1(v_{.04} + v_{.060983}^2 + v_j^3)$ which still must be 1.025313 .
From this we can solve for j, $j = .094$, the 3-year zero-coupon bond yield.