EXAM FM QUESTIONS OF THE WEEK

S. Broverman, 2006

Week of February 6/06

A company is considering issuing an annual coupon bond. The annual coupon rate will be set equal to the annual effective yield rate plus .02. The company calculates a sale price of \$120.21 for an n-year bond with face amount 100, and a sale price of \$128.17 for a $2n$-year bond with face amount 100. Find the price of a $3n$-year bond with a face amount of 100.

The solution can be found below.

Week of February 6/06 - Solution

Suppose that the annual effective yield rate is j and the coupon rate is $r = j + .02$.
We use the bond price formula

$$P = 100 + 100(r - j) \cdot a_{\overline{k}|j}$$

for a bond maturing in k years.

For the n-year bond, we have $120.21 = 100 + 100(.02) \cdot a_{\overline{n}|j}$, so that $2a_{\overline{n}|j} = 20.21$.

For the $2n$-year bond, we have $128.17 = 100 + 100(.02) \cdot a_{\overline{2n}|j}$, so that $2a_{\overline{2n}|j} = 28.17$.

Then, $\frac{28.17}{20.21} = 1.3939 = \frac{a_{\overline{2n}|j}}{a_{\overline{n}|j}} = \frac{1-v^{2n}}{1-v^n} = 1 + v^n \rightarrow v^n = .3939$.

For the $3n$-year bond, the price is $P = 100 + 100(.02) \cdot a_{\overline{3n}|j}$.
Then, $\frac{P-100}{20.21} = \frac{a_{\overline{3n}|j}}{a_{\overline{n}|j}} = \frac{1-v^{3n}}{1-v^n} = \frac{1-(.3939)^3}{1-.3939} = 1.55$ and therefore, $P = 131.33$.