EXAM FM QUESTIONS OF THE WEEK

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Week of February 25/08

A bond with a par value of 5,000 and 6% semiannual coupons is redeemable for 5,500. You are given

(i) the bond is purchased at P to yield 8%, convertible semiannually, and

(ii) the amount of principal adjustment for the 16th semiannual period is 25.

Calculate P.

The solution can be found below.

Week of February 25/08 - Solution

The bond has coupons of amount 150 every 6 months and a yield rate of 4% per 6 months. If we knew how many coupons to maturity, we could find the bond price P in the usual way, $P = 5,500v_{.04}^{n} + 150a_{\overline{n}|.04}$. The "amount of principal adjustment for the 16th semiannual period" is the change in book value from the end of the 15th to the end of the 16th semiannual period (note that the 16th period ends at time 16, and begins just after time 15, counting 6-month periods). For this bond, $Fr = 5,000(.03) = 150 < 220 = 5,500(.04) = Cj$. Therefore, the bond will be bought at a discount, and the bond is being "written up", so the book value increases from one period to the next. The amount of increase from BV_{15} to BV_{16} is 25. Using the relationship $BV_{15} \cdot (1+j) - Fr = BV_{16}$, and the fact that $BV_{16} = BV_{15} + 25$, we have $BV_{15}(1.04) - 150 = BV_{15} + 25$. Solving for BV_{15} we get $BV_{15} = 4375$. We can now use the retrospective form of the BV to get BV_0 ;
$BV_{15} = BV_0 \cdot (1+j)^{15} - Frs_{\overline{15}|j}$, so that $4375 = BV_0(1.04)^{15} - 150s_{\overline{15}|.04}$, and then $BV_0 = 4097$. BV_0 is the purchase price.