Study Note FM-09-05, Problem No. 55

Toby purchased a 20-year par value bond with semiannual coupons at a nominal annual rate of 8% convertible semiannually at a price of 1722.25. The bond can be called at par value 1100 on any coupon date starting at the end of year 15. What is the minimum yield that Toby could receive, expressed as a nominal annual rate of interest convertible semiannually?

A. 3.2%  B. 3.3%  C. 3.4%  D. 3.5%  E. 3.6%

Solution.
This bond sells at a premium, which means that its coupon is in excess of market interest rate. Hence, the minimum yield rate that accounts for the possibility of the bond being called is calculated to the earliest possible call date, i.e., exactly 15 years from the date of purchase, as that would be the most disadvantageous date for the bondholder for the call to occur. The minimum semiannual yield \( j = \frac{i^{(2)}}{2} \) (i.e., the worst case scenario yield) therefore satisfies the equation:

\[
1722.25 = 0.04 \cdot 1100 \cdot a_{\overline{44}}^{1/2} + \frac{1100}{(1 + j)^{30}},
\]

and with the use of a financial calculator, as follows (make sure the calculator is not in BGN mode)

1722.25 PV, \(-44\) PMT, \(-1100\) FV, 30 N, CPT I/Y,

\( j \) can be found to be 1.608245%. The corresponding nominal annual rate compounded semiannually is \( i^{(2)} = 2j \approx 3.216\% \).

Answer A.

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