CHAPTER 9: VALUING BONDS WITH EMBEDDED OPTIONS
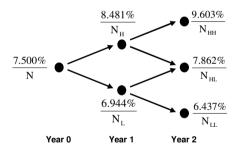
Problem 5)
The on-the-run issue for the Inc.Net Company is shown below:

Maturity	Yield to maturity (%)	Market price
1	7.5	100
2	7.6	100
3	7.7	100

Using the bootstrapping methodology, the spot rates are:

Maturity (years)	Spot rate (%)
1	7.500
2	7.604
3	7.710

Assuming an interest rate volatility of 10% for the 1-year rate, the binomial interest rate tree for valuing a bond with a maturity of up to three years is shown below:

a) Demonstrate using the 2-year on-the-run issue that the binomial interest rate tree above is in fact an arbitrage-free tree.
b) Demonstrate using the 3-year on-the-run issue that the binomial interest rate tree above is in fact an arbitrage-free tree.
c) Using the spot rates given above, what is the arbitrage-free value of a 3-year 8.5% coupon issue of Inc.Net Company?
d) Using the binomial tree, determine the value of an 8.5% 3-year option-free bond.
e) Suppose that the 3-year 8.5% coupon issue is callable starting in Year 1 at par (100) (that is, the call price is 100). Also assume that the following call rule is used: if the price exceeds 100 the issue will be called. What is the value of this 3-year 8.5% coupon callable issue?
f) What is the value of the embedded call option for the 3-year 8.5% coupon callable issue?

Problem 10)
a) Explain why the greater the assumed interest rate volatility the lower the value of a callable bond.
b) Explain why the greater the assumed interest rate volatility the higher the value of a putable bond.

Problem 13)
An assistant portfolio manager is trying to find the duration of a callable bond of FeedCo Corp. One vendor of analytical systems reported that the duration for the issue is 5.4. A dealer firm reported that the duration is 4.5. The assistant portfolio manager was confused by the difference in the reported durations for the FeedCo Corp. issue. He discussed the situation with the senior portfolio manager. In the discussion, the assistant portfolio manager commented: "I don't understand how such a difference could occur. After all, there is a standard formula for computing any duration." How should the portfolio manager respond?

Problem 17)
Suppose that a callable bond has an option-adjusted spread of zero. Does than mean the corporate bond is being overvalued in the market (i.e., trading rich)?